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COST EVALUATION FOR NINE FEDERAL MOTOR VEHICLE STANDARDS VOLUME I FMVSS 105

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**Contract No. DOT-HS-8-02015
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**NOVEMBER 1979
FINAL REPORT**

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16. Abstract The consumer cost was established for the implementation cost of each of the nine Federal Motor Vehicle Safety Standards. The standards study are: FMVSS 105 Hydraulic Brake Systems on Passenger Cars FMVSS 108 Side Marker Lamps FMVSS 122 Motorcycle Brake Systems FMVSS 202 Head Restraints FMVSS 207 Seating Systems FMVSS 213 Child Seating Systems FMVSS 220 School Bus, Rollover Protection FMVSS 221 School Bus, Joint Strength FMVSS 222 School Bus, Seating and Crash Protection For each standard a representative sample of makes and models of vehicles or components was established. the components required to meet the standard were purchased and their costs estimated. The first year of the imposition of the standard and the year immediately preceding it were emphasized. By analysis, the consumer costs attributed to the standard for each make and model or components were determined. A weighted average was developed from the samples and applied to the total industry volumes to determine the consumer cost for the implementation of each standard. The weighted average of weight variance due to the implementation of the standard was also determined. The before and after cost variance was not applied to FMVSS 213 Child Seating Systems and the FMVSS 122 Motorcycle Brake Systems.		
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METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
LENGTH				
in	inches	*2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km

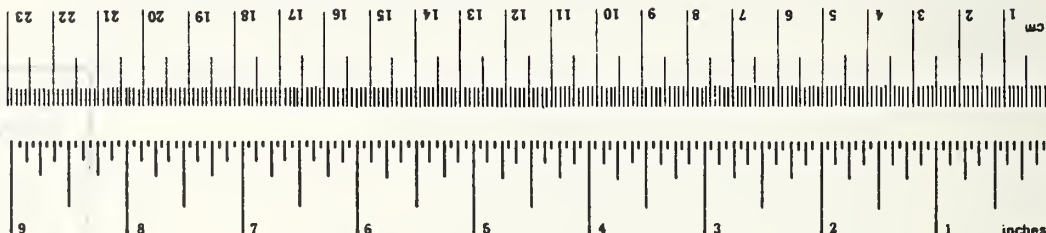
AREA				
in ²	square inches	6.5	square centimeters	cm ²
ft ²	square feet	0.09	square meters	m ²
yd ²	square yards	0.8	square meters	m ²
mi ²	square miles	2.6	square kilometers	km ²
	acres	0.4	hectares	ha

MASS (weight)				
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	tonnes	t

VOLUME				
tsp	teaspoons	5	milliliters	ml
Tbsp	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
pt	pints	0.47	liters	l
qt	quarts	0.95	liters	l
gal	gallons	3.8	liters	l
ft ³	cubic feet	0.03	cubic meters	m ³
yd ³	cubic yards	0.76	cubic meters	m ³

TEMPERATURE (exact)

°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C
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Approximate Conversions from Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
LENGTH				
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
m	meters	1.1	yards	yd
km	kilometers	0.5	miles	mi

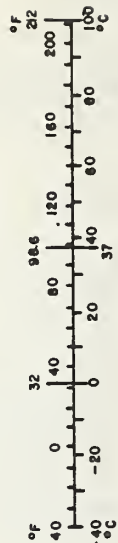
AREA				
cm ²	square centimeters	0.18	square inches	in ²
m ²	square meters	1.2	square yards	yd ²
km ²	square kilometers	0.4	square miles	mi ²
ha	hectares (10,000 m ²)	2.5	acres	

MASS (weight)				
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	

VOLUME				
ml	milliliters	0.03	fluid ounces	fl oz
l	liters	2.1	pints	pt
l	liters	1.06	quarts	qt
l	liters	0.26	gallons	gal
m ³	cubic meters	35	cubic feet	ft ³
m ³	cubic meters	1.3	cubic yards	yd ³

TEMPERATURE (exact)

°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F
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* 1 in = 2.54 exactly. For other exact conversions and more detailed tables, see NBS Misc. Publ. 286, Units of Weights and Measures, Price \$2.25, SD Catalog No. C13.10-286.

ABSTRACT

FMVSS 105 HYDRAULIC BRAKE SYSTEMS IN PASSENGER CARS

Under Contract DOT-HS-8-02015, the Contractor conducted a program to develop the consumer cost and weight variance resulting in the implementation of FMVSS 105 in the 1968 and 1976 passenger vehicles.

An Integrated Cost Sampling Plan was developed that provided for the selection of specimen vehicles from the four classes of vehicles. Total brake systems were purchased for 1966 vehicles and were considered the baseline systems. Cost and weight differential between 1966 and 1968 models was the result of the first implementation. The cost and weight difference between the 1968 and 1976 models was the result of the second implementation.

Automotive industry type teardown and manufacturing cost estimating techniques were applied and developed cost and weight data for the implementation analysis. The volume weighted method was used to establish cost and weight differential for the average in each car class. The Total Industry implementation cost and weight variance per vehicle was determined by applying the 1979 model year volume by class of vehicles to the derived class factors of weight and cost.

The consumer cost per vehicle for the 1968 implementation was \$11.80 and a weight increase of 15.83 pounds. The 1976 implementation consumer cost was \$10.57 with an increase of 25.94 pounds.

PREFACE

The Contractor, the De Lorean Motor Company, in the presentation of the Final Report on the Cost Evaluation for Nine Federal Motor Vehicle Standards has divided the report into six major categories. Each volume contains the complete study related to the designated standard or standards. The Contractor acknowledges the contribution of its staff, the automotive manufacturing community and the automotive dealers. Special acknowledgement is made to the Contract Technical Manager, Mr. Robert Lemmer of the National Highway Traffic Safety Administration, Department of Transportation, for his contributions and timely review throughout the program.

The cost estimating techniques employed in the study are based on automotive industry practice and have been previously used on other programs by the Contractor. The following listing includes recent and current programs using essentially the same estimating procedures and techniques as those employed in this study:

- Contract NHTSA-DOT-HS-701770

Development of a Motor Vehicle Materials Historial,
High-Volume Industrial Processing Rates Cost Data
Bank - Ford F-100 Truck

FMVSS 201 Study of passenger car requirements as
applied to light trucks and vans.

FMVSS 203 and 204 Study of passenger car require-
ments as applied to light trucks and vans.

- Contract NHTSA-DOT-HS-8-01767

Cost Evaluation of Four Federal Motor Vehicle Safety Standards.

Cost Review of Pedestrian Safety Modifications.

- Contract NHTSA-DOT-HS-9-02258

Cost Evaluation of Three Federal Motor Vehicle Safety Standards.

- Renault USA, Inc.

Consumer Cost Estimate of Subcompact Vehicles.

- De Lorean Motor Company

Manufacturing Cost Studies of Components of lightweight vehicles.

- Contract NHTSA-DOT-HS-9-02112

Preliminary incremental cost estimating for the implementation of the extension of FMVSS 105 to light trucks; vans and MVTs.

Study the cost and weight change for passenger car pedestrian initial impact protection implementation.

Product feasibility, consumer cost and implementation schedule analysis for implementing brake inspectability requirements.

Cost data developed on this program for automotive standards are based on 1979 Model Year Economics and 1978 macro-analysis of automotive and component manufacturers. For standards related to other than automotive manufacturers,

the data is based on 1979 year economics and macro-analysis factors applicable to the manufacturers. Dealer discount on related automotive products was established at 16.97% for the industry. A dealer discount of 25% was applied to the motorcycle related products. The child seats dealer discounts varied from 40% to 50%. Distributor cost where applicable is reflected in the dealer wholesale cost.

In reviewing this report, the reader is cautioned that the application of an average cost per pound factor that can be developed from the data presented could result in serious cost errors. Cost data can only effectively be developed by using manufacturing processing personnel applying automotive cost estimating technology. For any cost factor to be effective the designs, size, construction, and manufacturing techniques must be nearly the same. In this report a considerable variation can be noted in the cost and weight of what appears to be similar components. Only a detailed review of these components would explain the variation.

PROGRAM INDEX

VOLUME I	- FMVSS 105	HYDRAULIC BRAKE SYSTEMS ON PASSENGER CARS
VOLUME II	- FMVSS 108	LAMPS, REFLECTIVE DEVICES AND ASSOCIATED EQUIPMENT
VOLUME III	- FMVSS 122	MOTORCYCLE BRAKE SYSTEMS
VOLUME IV	- FMVSS 202	HEAD RESTRAINTS
	FMVSS 207	SEATING SYSTEMS
VOLUME V	- FMVSS 213	CHILD SEATING SYSTEMS
VOLUME VI	- FMVSS 220	SCHOOL BUS, ROLLOVER PROTECTION
	FMVSS 221	SCHOOL BUS, JOINT STRENGTH
	FMVSS 222	SCHOOL BUS, SEATING AND CRASH PROTECTION

TABLE OF CONTENTS

VOLUME I

FMVSS 105 HYDRAULIC BRAKE SYSTEMS FOR PASSENGER CARS	
	PAGE
INTRODUCTION	1
INTEGRATED SAMPLING PLAN	10
COST EVALUATION	12
CONCLUSION	26
APPENDIX A - SUMMARY OF COMPONENT COST AND WEIGHT DATA	
APPENDIX B - PHOTOGRAPHS OF SYSTEMS STUDIED	

COST EVALUATION OF NINE FEDERAL MOTOR VEHICLE STANDARDS
VOLUME I FMVSS 105 HYDRAULIC BRAKE SYSTEMS IN PASSENGER CARS

INTRODUCTION

Under Contract DOT-HS-8-02015, the Contractor conducted a program that developed the consumer cost and weight variance resulting from the implementation of FMVSS 105 in the 1968 and 1976 passenger vehicles.

An Integrated Cost Sampling Plan was developed, approved by the Contract Technical Manager, and followed to obtain, if any, changes in cost and weight of the brake system due to implementation of the standard.

Specimen vehicles were selected from all major manufacturers with all four class sizes represented. Total brake systems were purchased for the 1966 baseline systems and the 1968 and 1976 implementation modifications. Automotive industry type teardown and manufacturing cost estimating techniques were applied to develop cost and weight data for the implementation analysis.

Appendix A of this report represents a summary of cost elements and weight of components involved in the study. In Figure 1 elements of component cost are shown. The boxes with the solid lines contain data derived from the cost and weight processing of components of the systems studied. Those with dotted boxes are cost elements considered in the estimating processing and the summarized results are contained in the costs in Appendix A.

In this study, the consumer cost is the summation of the variable cost, corporation other cost and profit and dealer markup. The variable cost is considered as those costs that vary with the volume of production and consist of the cost of direct material, direct labor and variable burden. The Other Cost and Profit consist of those items identified in Figure 1 and are:

- Indirect Material
- Indirect Labor
- Fixed Burden
- Tooling Cost
- Engineering and Warranty Cost
- Selling and Administration Cost
- Other Corporate Costs
- Corporation Profits
- Distributor Cost

The Dealer-Markup consists of the dealers expense and profit.

The costs included in Appendix A are variable cost, dealer wholesale, dealer mark-up, and consumer cost.

The variable costs of production of components are those incremental costs associated with that component. The major categorical contributors to variable costs are direct labor, direct materials, and variable burden. Other minor contributors to variable cost such as setup costs, where applicable, are included in the variable burden rate.

ELEMENTS OF CONSUMER COST

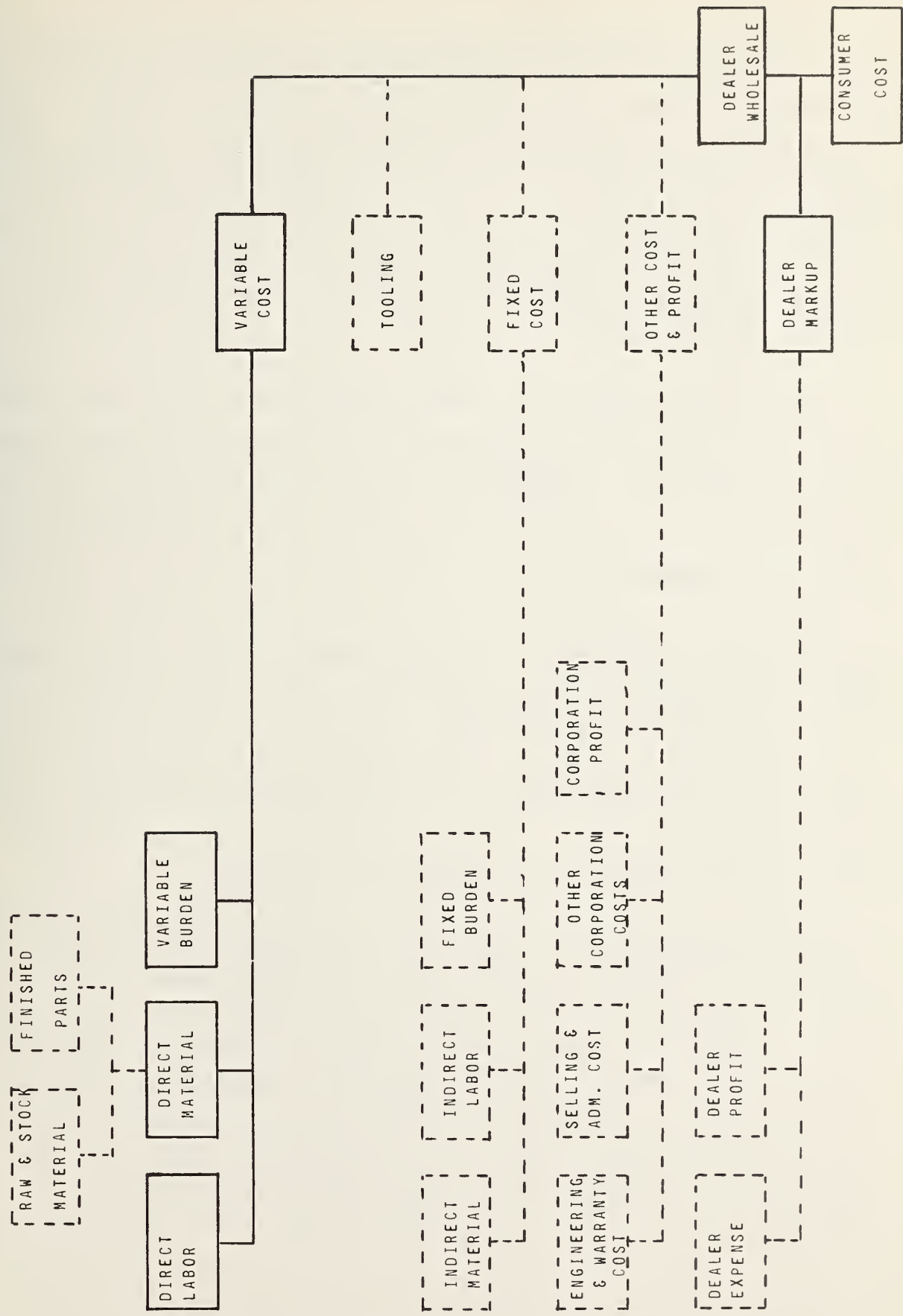


FIGURE 1

Direct labor costs are determined as an average rate depending on the worker classification required to perform the tasks identified in the process study (e.g., punch press operator, drill press operator, machinist). Average labor rates are determined from Union records, Department of Labor statistics, or a combination thereof. Labor fringe benefits and standard allowance for less than 100 percent labor efficiency are included in the average labor rate.

For each component, the process analysis identified the operation, type of equipment, pieces per hour, number of men, and number of machines. This data when extended by information from the data bank and all component operations summarized will produce the total direct labor cost per component.

Direct material costs are those costs associated with the purchase of all material required in the production process. Accordingly, direct material costs include the cost of not only the material in the finished component, but also that of the material scrapped minus salvage price, due to material removal or incorrectly worked components that cannot be salvaged.

Variable burden costs are estimated charges that attempt to account for all other expenses due to the production process and that vary directly with the production volume and that contribute to the cost of sales. Examples of sources of such expenses include, but are not limited to, perishable tools(e.g., drill bits, spot welding tips), fuel and power requirements and direct supervision and clerical. The total of all expenses

vary with the production quantity is estimated, based on a production planning volume. The sum of these expenses is then apportioned to each component on some logical scheme. The amount of apportionment is known as a variable burden rate.

Several methods of applying variable burden have been popularly accepted in the past as well as during current times. Total costs that are apportioned on the number of pieces produced, or material usage, misrepresent true costs whenever parts of different sizes or complexities are produced. Costs apportioned on direct labor misrepresent true costs in a highly automated production process.

This study utilizes a burden rate applied on occupancy time in a given machine, or station, performing a task during the production process. Burden rates are calculated on basis of a combination of machine or station complexity, cycle time, area occupied, and other considerations that more realistically reflect the true rate of apportionment of total variable expenses.

The cost development process and teardown procedure requires that each component be weighed, tagged with identification data, and analyzed for general type of material and manufacturing method utilized. Experienced personnel qualified by many years of production processing were employed to develop the basic data. The processing method, specific manufacturing operation, type of equipment, pieces per hour, number of men, number of machines, general type of material, rough weight of material and tooling costs were all elements of data furnished by the process engineer. A finite estimating

and processing technique utilizes this basic data plus model year economics and volumes contained in a data bank to extend the data into consumer cost.

The data bank contains approximately six hundred operation rates and over sixty materials utilized in the automotive type industry and covers twelve model year economics. In this study, the terms "Model Year Economics" and "Model Year Production Volumes" are utilized. The term model year directly related to a designated year of a vehicle design. Normally in the United States, the model year starts in retail sales approximately in September. The volume is related to the number of vehicles produced of a specific design year vehicle. The term economics relates to the average cost elements involved in the production of a specific car year. The model production years normally are not related to the calendar year or a corporation fiscal year. For this study, the Contract Technical Manager designated the Model Year Economics to be 1979.

The Dealer Wholesale Cost for this study was developed by use of the Macro-analysis Method. A factor expressing the relationship of the variable cost to the Dealer Wholesale Cost was obtained from studying financial data related to the specific industry or manufacturer of the product. The macro-analysis study utilized data obtained from public files, annual financial reports, the 10K Report filed annually by the United States manufacturers and previous cost studies of similar products. The variable cost multiplied by the factor will produce the dealer wholesale cost.

Although other methods can be used to derive a dealer wholesale cost, it is believed by the Contractor

that the variable cost macro-analysis factor method produces an acceptable average dealer wholesale cost.

The macro-analysis factor includes:

- A. Indirect labor - these costs are determined by apportioning the total estimated wages for indirect labor over the planned production volume. Indirect labor is comprised of, but not limited to, supervision and management, clerical, janitorial, plant security, etc. The total labor cost is not affected by variations in the production rate.
- B. Indirect material - these costs are determined by apportioning the total estimated costs for all material necessary for the proper functioning of the manufacturing plant and not related to the finished product over the planned production volume. Indirect materials are comprised of, but not limited to, stationery and office supplies, janitorial supplies, maintenance supplies, first aid and medical supplies, etc.
- C. Fixed burden - is determined by apportioning the remaining estimated expenses related to the operation of a manufacturing plant over the planned production volume. All such expenses are conveniently accumulated categorically as burden. Such expenses are comprised of, but not limited to, property taxes, insurance costs, depreciation charges on buildings and capital equipment, etc.

- D. Tooling cost - is determined by apportioning the total expense by special tooling to manufacture a component over the entire life production volume of that component. This cost factor could vary as the component or sub-component could have several years application beyond the study period of a program. Further, the component or sub-component could be extended over several product lines. Thus the years of amortization and production volumes could have a definite bearing on the tooling cost of the component. With this knowledge, the process engineer would be required to use judgment in the application of the amortization and volume factor.
- E. Other Cost and Profit - include items of engineering cost, warranty costs, selling and administrative costs, corporate burden and taxes (excluding factory burden and taxes), corporate depreciation and maintenance (excluding factory depreciation and maintenance), and other corporate costs and profit.

The dealer wholesale cost could be derived by the method of applying individual detailed cost factors stated above to the variable cost. This would produce a very accurate dealer wholesale cost. However, the data to accomplish this would not be available publicly or could it be expected that such confidential data would be made available for study groups.

Dealer Markup is the summation of all costs incurred in the operation of a dealership (salaries, taxes, depreciation, advertising, maintenance, etc.) and the dealer's profit. The Contractor was cognizant of a potential problem in attempting to arrive at an equitable dealer markup to apply in the cost calculations. The United States dealer is an independent business man over whom the manufacturer can exercise only limited controls. Although manufacturers have suggested retail prices, the dealer is actually free to bargain with each customer to establish the selling price for a vehicle. For this study it is assumed that the dealer's markup is based upon the full suggested price and is reflected in the consumer cost of the system or components studied.

Appendix B contained photographs for each system studied. These photographs provide a quick overview of the various systems.

Cost and weight data in Appendix A shows data to four decimal places. This does not indicate the degree of accuracy, but rather the result of the system used to develop the final weight and costs.

INTEGRATED COST SAMPLING PLAN

The Contractor developed an Integrated Cost Sampling Plan that designated specimen brake systems from related 1966, 1968 and 1976 passenger cars. All four major size passenger car classifications were represented. Table 1 indicates the passenger car system selected for the study.

Each system was subjected to a manufacturing cost analysis of the automotive manufacturing type. All components were disassembled and torn down to the most practical level necessary to produce reliable basic data. The processing of the data was previously described in the introduction.

Incremental consumer cost and weight variance of brake systems between model production years 1966 and 1968 specimens are considered the consumer cost and weight variance resulting from the implementation of the 1968 standard.

Incremental consumer cost and weight variance of brake systems between model production years 1968 and 1976 specimens are considered the consumer cost and weight variance from the implementation of the 1975 standard on the 1976 vehicles.

TABLE 1

FMVSS 105 HYDRAULIC BRAKE SYSTEMS IN
PASSENGER CARS

MAKES AND MODELS OF BRAKING SYSTEM COMPONENTS STUDIED.

MANUFACTURER	MODEL PRODUCTION YEAR	
	1966 and 1968	1976
AMERICAN MOTORS	RAMBLER	GREMLIN
CHRYSLER	VALIANT FURY	VALIANT FURY
FORD	FALCON GALAXIE LINCOLN CONTINENTAL	MAVERICK GALAXIE LINCOLN CONTINENTAL
GENERAL MOTORS	CHEVROLET CHEVY II CHEVROLET CHEVELLE CHEVROLET CAPRICE PONTIAC BONNEVILLE BUICK ELECTRA	CHEVROLET NOVA CHEVROLET CHEVELLE CHEVROLET CAPRICE PONTIAC BONNEVILLE BUICK ELECTRA
TOYOTA	COROLLA* CORONA	COROLLA CORONA
VOLKSWAGEN	BEETLE	BEETLE

*NOT AVAILABLE IN 1966

COST EVALUATION - HYDRAULIC BRAKE SYSTEMS IN PASSENGER CARS

The Contractor has studied the history of the hydraulic brake systems standards. It was first proposed in February 1967 to become effective January 1, 1968. In August 1972 a major amendment was published as FMVSS 105a. This significantly upgraded the standard and extended its applicability to multipurpose passenger vehicles, trucks, and buses equipped with hydraulic brake systems. This was proposed to become effective September 1, 1974, later delayed one year to September 1, 1975 and revised in a standard published May 18, 1973. This was followed by a revision to Standard 105-75 in February 1974. This standard resulted in a general upgrading of braking performance. It was made applicable to passenger cars and to school buses manufactured on and after April 1, 1977 with hydraulic service brake systems. This study developed the implemented cost and weight variance for the standard change in the 1968 and 1976 model passenger cars.

The following components of the brake system were purchased and were the basis for the analysis:

- Front brake assembly complete
- Rear brake assembly complete
- Master cylinder and power booster (if required)
- Foot pedal and linkage
- Brake system tubing and fittings
- Warning light
- Proportional Valve
- Parking brake system

Each system was subjected to a manufacturing cost analysis of the automotive manufacturing type. Data

were summarized for each system and presented in Appendix A. Costs are based on the 1979 model production year economics and the 1978 automotive financial data for the determination of the macro-analysis factor.

Table 2 presents a consolidated tabulation of the weight variance and consumer cost of each model vehicle brake system studied.

Table 3 through 6 classifies the specimen systems by size class of vehicles and present the average implementation weight variance and consumer cost by size class for the 1968 implementation. The basic line system is the 1966 model. The differential cost and weight between 1966 and 1968 systems is considered the cost and weight variance caused by the implementation of the standard affecting the 1968 models.

Table 7 presents the Total Industry consumer cost and weight variance resulting from the implementation of the standard in 1968. The implementation cost and weight factor determined by class of vehicle was applied to the class volume of the 1979 model year production. A volume weighted implementation cost and weight variance for the United States industry was derived by this process.

Table 8 through 11 present the same type of information as Tables 3 through 6 except the consumer cost and weight variance reflect the differential between the 1968 and 1976. This differential is considered the consumer cost weight variance resulting from the implementation of the standard in the 1976 passenger cars.

Table 12 presents the same type of information as Table 7 except it reflects the Total Industry consumer cost and weight resulting from the implementation of the standard in 1976. The implementation consumer cost and weight variance is based upon the factor derived from data contained in Tables 8 through 11 and the application of the factor to the 1979 model production volume. The volume weighted implementation cost and weight variance for the Total Industry was derived by this process.

Photographs of all systems studied are presented in Appendix B.

TABLE 2

FMVSS 105 HYDRAULIC BRAKE SYSTEMS IN PASSENGER CARS
CONSUMER COST AND WEIGHT OF BRAKE SYSTEMS STUDIED
(BASED ON 1979 MODEL PRODUCTION YEAR ECONOMICS)

MANUFACTURER	MODEL	SIZE CLASS	1966 MODEL YEAR WEIGHT-POUNDS	1966 MODEL YEAR COST \$	1968 MODEL YEAR WEIGHT-POUNDS	1968 MODEL YEAR COST \$	1976 MODEL YEAR WEIGHT-POUNDS	1976 MODEL YEAR COST \$
AMERICAN MOTORS	RAMBLER-GREMLIN	C	119.48	246.85	121.53	248.41	168.30	232.78
CHRYSLER	VALIANT FURY	C	108.33	204.28	117.14	235.77	150.48	265.99
		S	148.91	232.48	166.55	250.06	153.90	277.95
FORD	FALCON-MAVERICK	C	101.32	204.28	130.64	282.48	153.04	254.41
	GALAXIE	S	148.86	241.45	173.89	295.14	210.92	301.75
	LINCOLN CONTINENTAL	S	196.25	282.82	194.95	290.35	194.00	315.62
GENERAL MOTORS	CHEVROLET-CHEVY II- -NOVA	C	114.86	222.59	134.32	239.08	158.98	240.62
	-CHEVELLE	I	100.12	217.93	118.34	217.60	163.81	248.68
	-CAPRICE	S	142.62	227.68	160.95	225.20	176.26	229.60
	PONTIAC-BONNEVILLE	S	153.58	231.57	167.69	235.50	190.02	224.09
	BUICK-ELECTRA	S	198.90	247.32	193.35	281.09	172.41	230.87
TOYOTA	COROLLA	SC	-	-	59.93	170.39	98.91	225.67
	CORONA	SC	81.33	178.32	101.52	202.74	114.68	226.47
VOLKSWAGEN	BEETLE	SC	73.74	186.09	86.68	202.30	86.79	202.47
SC-SUBCOMPACT	C-COMPACT	I-INTERMEDIATE	S-STANDARD					

TABLE 3

WEIGHTED AVERAGE CONSUMER COST AND WEIGHT VARIANCE RESULTING FROM
IMPLEMENTATION OF FMVSS 105 IN 1968 ON SPECIMEN VEHICLES
(BASED ON 1979 MODEL PRODUCTION YEAR ECONOMICS)

CLASS - SUBCOMPACT		1968 MODEL PRODUCTION VOLUME	SYSTEM WEIGHT (POUNDS)		SYSTEM CONSUMER COST (DOLLARS)	
MANUFACTURER	MODEL		1966 MODEL	1968 MODEL	1966 MODEL	1968 MODEL
TOYOTA	COROLLA	36,193**	*	59.93	-	170.39
	CORONA	29,613	81.33	101.52	20.19	202.74
VOLKSWAGEN	BEETLE	380,719	73.74	86.68	12.94	202.30
					186.09	202.30
TOTAL SUBCOMPACT STUDIED		410,332				
WEIGHTED AVERAGE OF SUBCOMPACT STUDIED					13.46	16.80

* NOT AVAILABLE IN 1966

** NOT INCLUDED IN TOTAL

TABLE 4

WEIGHTED AVERAGE CONSUMER COST AND WEIGHT VARIANCE RESULTING FROM
IMPLEMENTATION OF FMVSS 105 IN 1968 ON SPECIMEN VEHICLES
(BASED ON 1979 MODEL PRODUCTION YEAR ECONOMICS)

CLASS - COMPACT		1968 MODEL PRODUCTION VOLUME	SYSTEM WEIGHT (POUNDS)		SYSTEM CONSUMER COST (DOLLARS)	
MANUFACTURER	MODEL		1966 MODEL	1968 MODEL	1966 MODEL	1968 MODEL
AMERICAN MOTORS	RAMBLER	81,000	119.48	121.53	246.85	248.41
				2.05		1.56
CHRYSLER	VALIANT	110,800	108.33	117.14	204.28	235.77
				8.81		31.49
FORD	FALCON	41,700	101.32	130.64	204.28	282.48
				29.32		78.20
GENERAL MOTORS	CHEVROLET- CHEVY II	201,000	114.86	134.32	222.59	239.08
				19.46		16.49
TOTAL COMPACTS STUDIED		434,500				
WEIGHTED AVERAGE OF COMPACTS STUDIED				14.44		23.45

TABLE 5

WEIGHTED AVERAGE CONSUMER COST AND WEIGHT VARIANCE RESULTING FROM
IMPLEMENTATION OF FMVSS 105 IN 1968 ON SPECIMEN VEHICLES
(BASED ON 1979 MODEL PRODUCTION YEAR ECONOMICS)

CLASS - INTERMEDIATE					
MANUFACTURER	MODEL	1968 MODEL PRODUCTION VOLUME	SYSTEM WEIGHT (POUNDS)		CONSUMER COST (DOLLARS)
			1966 MODEL	1968 MODEL IMPLEMENTATION	1966 MODEL IMPLEMENTATION
GENERAL MOTORS	CHEVROLET-				
	CHEVELLE	422,900	100.12	118.34	217.93
				18.22	217.60
TOTAL INTERMEDIATE STUDIED		422,900			(.33)
WEIGHTED AVERAGE OF INTERMEDIATE STUDIED				18.22	(.33)

TABLE 6

WEIGHTED AVERAGE CONSUMER COST AND WEIGHT VARIANCE RESULTING FROM
IMPLEMENTATION OF FMVSS 105 IN 1968 ON SPECIMEN VEHICLES
(BASED ON 1979 MODEL PRODUCTION YEAR ECONOMICS)

CLASS - STANDARD					
MANUFACTURER	MODEL	1968 MODEL PRODUCTION VOLUME	SYSTEM WEIGHT (POUNDS)		SYSTEM CONSUMER COST (DOLLARS)
			1966 MODEL	1968 MODEL	1966 MODEL
				IMPLEMENTATION	IMPLEMENTATION
CHRYSLER	FURY	285,000	148.91	166.55	232.48
				17.64	250.06
					17.58
FORD	GALAXIE	790,700	148.86	173.89	241.45
				25.03	295.14
					53.69
FORD	LINCOLN CONTINENTAL	39,100	196.25	194.95	282.82
				(1.30)	290.35
					7.53
GENERAL MOTORS	CHEVROLET- CAPRICE	1,236,400	142.62	160.95	227.68
				18.33	225.20
					(2.48)
	PONTIAC BONNEVILLE	457,500	153.58	167.69	231.57
				14.11	235.50
					3.93
	BUICK ELECTRA	375,100	198.90	191.53	247.32
				(7.37)	277.05
					29.73
TOTAL STANDARDS STUDIED		3,183,800			
WEIGHTED AVERAGE OF STANDARDS STUDIED				16.06	18.10

TABLE 7

TOTAL INDUSTRY
WEIGHTED AVERAGE CONSUMER COST AND WEIGHT VARIANCE
PER VEHICLE RESULTING FROM THE IMPLEMENTATION OF FMVSS 105 IN 1968
(BASED ON 1979 MODEL YEAR ECONOMICS AND VOLUME)

CLASS	1979 MODEL PRODUCTION VOLUME	STUDIED WEIGHTED AVERAGE WEIGHT/VEHICLE (POUNDS)	STUDIED WEIGHTED AVERAGE COST/VEHICLE \$
SUBCOMPACT	1,388,755	13.46	16.80
COMPACT	2,239,350	14.44	23.45
INTERMEDIATE	2,444,659	18.22	(.33)
STANDARD	2,507,159	16.06	18.10
TOTAL U.S. INDUSTRY LESS VEHICLES BELOW	8,579,923		
WEIGHTED AVERAGE OF U.S. INDUSTRY LESS VEHICLES BELOW		15.83	11.80
SPECIALTY LUXURY -	533,887		
INTERMEDIATE	244,167		
TOTAL U.S. INDUSTRY	9,357,977		

TABLE 8

WEIGHTED AVERAGE CONSUMER COST AND WEIGHT VARIANCE RESULTING FROM
IMPLEMENTATION OF FMVSS 105 IN 1976 ON SPECIMEN VEHICLES
(BASED ON 1979 MODEL PRODUCTION YEAR ECONOMICS)

CLASS - SUBCOMPACT

MANUFACTURER	MODEL	1976 MODEL PRODUCTION VOLUME	SYSTEM WEIGHT (POUNDS)		SYSTEM CONSUMER COST (DOLLARS)	
			1968 MODEL	1976 MODEL	1968 MODEL	1976 MODEL
TOYOTA	COROLLA	133,204	59.93	98.91	170.39	225.67
	CORONA	68,336	101.52	114.68	202.74	226.47
VOLKSWAGEN	BEETLE- RABBIT	121,940	86.68	86.79	202.30	202.47
				.11		.17
TOTAL SUBCOMPACT STUDIED		323,480				
WEIGHTED AVERAGE OF SUBCOMPACT STUDIED				18.87		27.84

TABLE 9

WEIGHTED AVERAGE CONSUMER COST AND WEIGHT VARIANCE RESULTING FROM
IMPLEMENTATION OF FMVSS 105 IN 1976 ON SPECIMEN VEHICLES
(BASED ON 1979 MODEL PRODUCTION YEAR ECONOMICS)

CLASS - COMPACT		MODEL	1976 MODEL PRODUCTION VOLUME	SYSTEM WEIGHT (POUNDS)			SYSTEM CONSUMER COST (DOLLARS)	
MANUFACTURER				1968 MODEL	1976 MODEL	IMPLEMENTATION	1968 MODEL	1976 MODEL
1 AMERICAN MOTORS		RAMBLER-						
2 GREMLIN		(CLASSIFICA-						
2 TION CHANGE)								
1								
			52,936	121.53	168.30	46.77	248.41	232.78
								(15.63)
CHRYSLER		VALIANT	85,710	117.14	150.48	33.34	235.77	265.99
								30.22
FORD		FALCON-						
		MAVERICK	104,268	130.64	153.04	22.40	282.48	254.41
								(28.07)
GENERAL MOTORS		CHEVROLET-	334,728	134.32	158.98	24.66	239.08	240.62
		CHEVY II-						1.54
		NOVA						
TOTAL COMPACTS STUDIED			577,642					
WEIGHTED AVERAGE OF COMPACTS STUDIED						27.57		(1.12)

TABLE 10

WEIGHTED AVERAGE CONSUMER COST AND WEIGHT VARIANCE RESULTING FROM
IMPLEMENTATION OF FMVSS 105 IN 1976 ON SPECIMEN VEHICLES
(BASED ON 1979 MODEL PRODUCTION YEAR ECONOMICS)

CLASS - INTERMEDIATE						
MANUFACTURER	MODEL	1976 MODEL PRODUCTION VOLUME	SYSTEM WEIGHT (POUNDS)		SYSTEM CONSUMER COST (DOLLARS)	
			1968 MODEL	1976 MODEL	1968 MODEL	1976 MODEL
GENERAL MOTORS	CHEVROLET- CHEVELLE	307,970	118.34	163.81	217.60	248.68
				45.47		31.08
TOTAL INTERMEDIATE STUDIED		307,970				
WEIGHTED AVERAGE OF INTERMEDIATES STUDIED				45.47		31.08

TABLE 11

WEIGHTED AVERAGE CONSUMER COST AND WEIGHT VARIANCE RESULTING FROM
IMPLEMENTATION OF FMVSS 105 IN 1976 ON SPECIMEN VEHICLES
(BASED ON 1979 MODEL PRODUCTION YEAR ECONOMICS)

CLASS - STANDARD							
MANUFACTURER	MODEL	1976 MODEL PRODUCTION VOLUME	1968 MODEL	SYSTEM WEIGHT 1976 MODEL	SYSTEM WEIGHT (POUNDS) IMPLEMENTATION	SYSTEM 1968 MODEL	CONSUMER COST (DOLLARS) 1976 MODEL IMPLEMENTATION
CHRYSLER	FURY	50,757	166.55	153.90	(12.65)	250.06	277.95 27.89
1 FORD	GALAXIE	238,974	173.89	210.92	37.03	295.14	301.75 6.61
24 FORD	LINCOLN CONTINENTAL	68,646	194.95	194.00	(.95)	290.35	315.62 25.27
GENERAL MOTORS	CHEVROLET- CAPRICE	333,976	160.95	176.26	15.31	225.20	229.60 4.40
	PONTIAC- BONNEVILLE	137,216	167.69	190.02	22.33	235.50	224.09 (11.41)
	BUICK- ELECTRA	282,040	193.35	172.41	(20.94)	281.09	(8.57) (50.22)
TOTAL STANDARD	STUDIED	1,111,609					
WEIGHTED AVERAGE OF STANDARDS STUDIED					9.37		(8.57)

TABLE 12

TOTAL INDUSTRY

WEIGHTED AVERAGE CONSUMER COST AND WEIGHT VARIANCE
PER VEHICLE RESULTING FROM THE IMPLEMENTATION OF FMVSS 105 IN 1976
(BASED ON 1979 MODEL YEAR ECONOMICS AND VOLUME)

CLASS	1979 MODEL PRODUCTION VOLUME	STUDIED WEIGHTED AVERAGE WEIGHT/VEHICLE (POUNDS)	STUDIED WEIGHTED AVERAGE COST/VEHICLE \$
SUBCOMPACT	1,388,755	18.87	27.84
COMPACT	2,239,350	27.57	(1.12)
INTERMEDIATE	2,444,659	45.47	31.08
STANDARD	2,507,159	9.37	(8.57)
TOTAL U.S. INDUSTRY	8,579,923		
LESS VEHICLES BELOW			
WEIGHTED AVERAGE OF U.S. INDUSTRY LESS VEHICLES BELOW		25.94	10.57
SPECIALTY LUXURY-	533,887		
INTERMEDIATE	244,167		
TOTAL U.S. INDUSTRY	9,357,977		

CONCLUSION

Based on this study and the weighted volume method of determining the industry average implementation consumer cost and weight variance, the implementation average consumer cost per vehicle for the 1968 implementation was \$11.80 and resulted in a system weight increase of 15.83 pounds. The implementation average cost per vehicle for the 1976 implementation was \$10.57 and results in a system weight increase of 25.94 pounds. No secondary weight or consumer cost is included in this study.

During the process of automotive teardown weight and cost studies, certain component designs and manufacturing methods produce weight and cost data that unless clarified, would leave the reader of the report with questions. Photographs are available in Appendix B that will clarify many questions reflecting design changes and number of actual components required for manufacturing. Such a case is the power booster of the 1968 Falcon and 1976 Maverick. A review of the cost data of these two units in Appendix A-5 indicates that the weight varies from 12.3 pounds to 6.1 pounds and the consumer cost varies from \$37.21 to \$18.91. On page 28, a photograph indicates the reason for such variation. The 1976 design is simple and with extremely few components, the 1968 design has many components requiring additional material and labor to produce.

Following are significant weight and cost variance requiring clarification:

AMC Rambler-Gremlin 1968 & 1976 System

The major cause for the weight and cost variance was the change from a drum to a disc design. The use of additional grey iron in the design caused the weight to increase, but the cost was lower due to the significant lower cost of grey iron per pound than previous material used.

CHRYSLER Fury 1968 & 1976 System

The rear brake drum was redesigned and resulted in a 14 pound per car reduction of weight between the 1968 and 1976 models.

FORD Falcon-Maverick 1968 & 1976 System

Lincoln-Continental 1968 & 1976 System

On the 1968 models the hub and rotor are separate components, and the 1976 models the hub and rotor are integrated into one part.

GM Pontiac-Bonneville 1968 & 1976 Model

A weight increase resulted in the integrated hub and rotor from brake system on the Bonneville. The 1976 caliper system was simplified and the number of components required was reduced.

GM Buick-Electra 1968 Model (See Appendix A-12)

The consumer cost of the Front Brake Assembly was relatively high compared to other models. This high cost was a result of the manufacturing method and material selection to produce the four cylinder calipers.



DESIGN COMPARISON BETWEEN THE 1968 FORD FALCON
AND THE 1976 FORD MAVERICK POWER BOOSTER

APPENDIX A

SUMMARY OF COMPONENT COST AND WEIGHT DATA

FMVSS - 105 HYDRAULIC BRAKE SYSTEM IN PASSENGER CARS SUMMARY OF COMPONENT COST AND WEIGHT DATA

Item	AMERICAN MOTORS	Req'd Per Vehicle	Material	Weight	Total Tooling (\$000)	COST PER VEHICLE \$							Dealer Markup	Consumer Cost	
						VARIABLE COST			Whole- sale Cost						
						Material	Labor	Burden							Total
1966 AMERICAN RAMBLER															
FRONT BRAKE ASSEMBLY		-	VAR	51.0808	1095.	11.7077	10.9597	26.1363	48.8037	65.2652	13.3141	78.5793			
REAR BRAKE ASSEMBLY		-	VAR	41.4956	1040.	10.8291	11.5193	27.9298	50.2782	67.2370	13.7164	80.9534			
MASTER CYLINDER		-	VAR	5.1801	595.	1.5065	3.3200	6.0746	10.9011	14.5780	2.9740	17.5520			
FOOT PEDAL AND LINKAGE		-	VAR	2.8891	240.	1.2988	1.2585	2.4617	5.0190	6.7119	2.0404	8.7523			
POWER BOOSTER		-	VAR	9.1383	1740.	6.9666	4.2075	5.8745	17.0486	22.7990	4.6511	27.4501			
BRAKE SYSTEM TUBING AND FITTING(WARNING LIGHT, PROP. VALVE)		-	VAR	1.8879	145.	6.4873	2.2067	2.2999	10.9939	14.7021	2.9993	17.7014			
PARKING BRAKE SYSTEM		-	VAR	7.8063	785.	3.2838	2.6433	3.9253	9.8524	13.1756	2.6878	15.8634			
TOTAL		-	VAR	119.4781	5640.	42.0798	36.1150	74.7021	152.8969	204.4688	42.3831	246.8519			
1968 AMERICAN RAMBLER															
FRONT BRAKE ASSEMBLY		-	VAR	50.8312	965.	11.3785	9.1219	22.0285	42.5289	56.8739	11.6023	68.4762			
REAR BRAKE ASSEMBLY		-	VAR	40.9560	1045.	11.5068	11.7803	28.4982	51.7853	69.2525	14.1275	83.3800			
MASTER CYLINDER		-	VAR	5.3901	605.	2.5793	3.3332	6.8233	12.7358	17.0316	3.4744	20.5060			
FOOT PEDAL AND LINKAGE		-	VAR	3.3603	240.	1.5136	1.0036	2.2591	4.7763	6.3873	1.3031	7.6904			
POWER BOOSTER		-	VAR	10.1383	1715.	7.8808	3.9601	6.0591	17.9000	23.9377	4.8833	28.8210			
BRAKE SYSTEM TUBING AND FITTING(WARNING LIGHT, PROP. VALVE)		-	VAR	3.0502	390.	8.0563	2.9175	3.9236	14.8974	19.9223	3.9924	23.9147			
PARKING BRAKE SYSTEM		-	VAR	7.8063	785.	3.2802	2.3499	4.0734	9.7035	12.9765	2.6472	15.6237			
TOTAL		-	VAR	121.5324	5745.	46.1955	34.4665	73.6652	154.3272	206.3818	42.0302	248.4120			
1976 AMERICAN RAMBLER															
FRONT BRAKE ASSEMBLY		-	VAR	85.5484	745.	17.0634	6.3549	15.3186	38.7369	51.8029	10.5677	62.3706			
REAR BRAKE ASSEMBLY		-	VAR	51.6496	1245.	13.6766	10.5592	23.9753	48.2111	64.4727	13.1524	77.6251			
MASTER CYLINDER		-	VAR	7.1502	470.	1.7789	2.8617	5.5521	10.1927	13.6307	2.7807	16.4114			
FOOT PEDAL AND LINKAGE		-	VAR	2.9235	255.	1.2486	0.8852	1.8275	3.9613	5.2974	1.6105	6.9079			
POWER BOOSTER		-	VAR	9.4563	867.	6.6862	2.6885	5.5327	14.9074	19.9357	4.0668	24.0025			
BRAKE SYSTEM TUBING AND FITTING(WARNING LIGHT, PROP. VALVE)		-	VAR	4.4692	310.	10.9863	2.7813	4.0244	17.7920	23.7932	4.8539	28.6471			
PARKING BRAKE SYSTEM		-	VAR	7.1038	815.	2.7669	3.3307	4.3445	10.4421	13.9642	2.8487	16.8129			
TOTAL		-	VAR	168.3010	4707.	54.2067	29.4615	60.5751	144.2435	192.8968	39.8807	232.7775			

Item	CHRYSLER CORPORATION	Req'd Per Vehicle	Material	Weight	Total Tooling (\$000)	COST PER VEHICLE \$							Consumer Cost
						VARIABLE COST			Whole- sale Cost	Dealer Markup			
						Material	Labor	Burden				Total	
1966 CHRYSLER VALIANT													
FRONT BRAKE ASSEMBLY		-	VAR	46.6604	1000.	12.2061	8.9699	19.6771	40.8531	11.1451	65.7780		
REAR BRAKE ASSEMBLY		-	VAR	39.9576	972.	11.5911	8.1333	17.6937	37.4181	10.2080	60.2472		
MASTER CYLINDER		-	VAR	4.0086	284.	1.0487	2.2601	3.8600	7.1688	1.9558	11.5426		
FOOT PEDAL AND LINKAGE		-	VAR	2.3647	109.	0.9365	0.7954	2.3316	4.0635	1.1086	6.5427		
POWER BOOSTER		-	VAR	6.4929	605.	5.7119	2.8443	5.4297	13.9859	3.8150	22.5183		
BRAKE SYSTEM TUBING AND FITTING(WARNING LIGHT, PROP. VALVE)		-	VAR	3.3449	265.	8.6641	2.3160	3.5115	14.4916	3.9535	23.3331		
PARKING BRAKE SYSTEM		-	VAR	5.4975	396.	1.8655	3.3240	3.7041	8.8936	2.4263	14.3197		
TOTAL		-	VAR	108.3266	3631.	42.0239	28.6430	56.2077	126.8746	34.6123	204.2816		
1968 CHRYSLER VALIANT													
FRONT BRAKE ASSEMBLY		-	VAR	45.5728	1110.	12.8876	9.2865	20.8207	42.9948	11.7294	69.2263		
REAR BRAKE ASSEMBLY		-	VAR	41.0142	825.	11.5602	9.0672	18.2527	38.8801	10.6068	62.6012		
MASTER CYLINDER		-	VAR	6.0462	357.	1.5190	2.9770	5.8702	10.3662	2.8280	16.6907		
FOOT PEDAL AND LINKAGE		-	VAR	2.9995	107.	1.0863	0.7954	2.3316	4.2133	1.1495	6.7839		
POWER BOOSTER		-	VAR	11.4546	1063.	8.1804	3.6538	7.4694	19.3036	5.2662	31.0809		
BRAKE SYSTEM TUBING AND FITTING(WARNING LIGHT, PROP. VALVE)		-	VAR	4.7373	510.	10.4525	3.6369	5.4802	19.5696	5.3388	31.5092		
PARKING BRAKE SYSTEM		-	VAR	5.3178	614.	1.9220	4.3731	4.8108	11.1059	3.0298	17.8817		
TOTAL		-	VAR	117.1424	4586.	47.6080	33.7899	65.0356	146.4335	39.9485	235.7739		
1976 CHRYSLER VALIANT													
FRONT BRAKE ASSEMBLY		-	VAR	71.0920	672.	16.7576	8.1052	18.2027	43.0655	11.7487	69.3402		
REAR BRAKE ASSEMBLY		-	VAR	38.4644	909.	12.3754	10.2034	19.3482	41.9270	11.4380	67.5070		
MASTER CYLINDER		-	VAR	7.8283	302.	1.6176	2.5832	5.2053	9.4061	2.5660	15.1448		
FOOT PEDAL AND LINKAGE		-	VAR	3.4083	140.	1.5548	0.8392	2.4557	4.8497	1.3230	7.8085		
POWER BOOSTER		-	VAR	12.8540	920.	8.2976	4.8852	9.9258	23.1086	6.3043	37.2074		
BRAKE SYSTEM TUBING AND FITTING(WARNING LIGHT, PROP. VALVE)		-	VAR	7.3035	740.	10.9456	6.1900	11.9239	29.0595	7.9277	46.7890		
PARKING BRAKE SYSTEM		-	VAR	9.5296	573.	3.5296	4.5398	5.7171	13.7865	3.7611	22.1978		
TOTAL		-	VAR	150.4801	4256.	55.7382	37.3460	72.7787	165.2029	45.0688	265.9847		

FMVSS - 105 HYDRAULIC BRAKE SYSTEM IN PASSENGER CARS SUMMARY OF COMPONENT COST AND WEIGHT DATA

Item	CHRYSLER CORPORATION	Req'd Per Vehicle	Material	Weight	Total Tooling (\$000)	COST PER VEHICLE \$							Dealer Markup	Consumer Cost
						VARIABLE COST				Whole- sale Cost				
						LABOR			Total					
						Material	Labor	Burden						
1966 CHRYSLER FURY														
FRONT BRAKE ASSEMBLY		-	VAR	67.3692	955.	18.5919	9.1219	21.8149		49.5287	13.5119	79.7466		
REAR BRAKE ASSEMBLY		-	VAR	55.4702	907.	14.8644	9.4129	18.1781		42.4554	11.5822	68.3578		
MASTER CYLINDER		-	VAR	3.9786	284.	1.0487	2.2601	3.8600		7.1688	1.9558	11.5426		
FOOT PEDAL AND LINKAGE		-	VAR	2.7525	104.	0.9004	0.8012	2.1709		3.8725	1.0564	6.2351		
POWER BOOSTER		-	VAR	8.2849	709.	6.1648	3.3413	7.6799		17.1860	4.6885	27.6713		
BRAKE SYSTEM TUBING AND FITTING(WARNING LIGHT, PROP. VALVE)		-	VAR	4.6446	225.	8.4849	2.0139	3.3968		13.8956	3.7908	22.3734		
PARKING BRAKE SYSTEM		-	VAR	6.4077	519.	2.5707	3.2875	4.4231		10.2813	2.8048	16.5540		
TOTAL		-	VAR	148.9077	3703.	52.6258	30.2388	61.5237		144.3883	39.3904	232.4808		
1968 CHRYSLER FURY														
FRONT BRAKE ASSEMBLY		-	VAR	76.2662	952.	18.7682	10.5658	22.0344		51.3684	14.0137	82.7087		
REAR BRAKE ASSEMBLY		-	VAR	56.9432	812.	15.4772	9.1491	18.7883		43.4146	11.8439	69.9022		
MASTER CYLINDER		-	VAR	6.0462	357.	1.5190	2.9770	5.8702		10.3662	2.8280	16.6907		
FOOT PEDAL AND LINKAGE		-	VAR	4.7655	152.	1.6361	0.8782	1.8170		4.3313	1.1817	6.9739		
POWER BOOSTER		-	VAR	8.8888	574.	5.3310	2.8564	5.8668		14.0542	3.8341	22.6288		
BRAKE SYSTEM TUBING AND FITTING(WARNING LIGHT, PROP. VALVE)		-	VAR	6.1318	735.	9.5913	3.7742	6.4235		19.7890	5.3987	31.8625		
PARKING BRAKE SYSTEM		-	VAR	7.5089	660.	3.3822	3.5370	5.0661		11.9853	3.2697	19.2976		
TOTAL		-	VAR	166.5506	4242.	55.7050	33.7377	65.8663		155.3090	42.3698	250.0644		
1978 CHRYSLER FURY														
FRONT BRAKE ASSEMBLY		-	VAR	72.1862	1267.	15.2055	9.2847	19.0460		43.5362	11.8770	70.0980		
REAR BRAKE ASSEMBLY		-	VAR	40.1108	925.	11.5557	9.6508	19.8683		41.0748	11.2056	66.1349		
MASTER CYLINDER		-	VAR	7.8002	364.	1.6599	3.0190	5.8771		10.5560	2.8798	16.9963		
FOOT PEDAL AND LINKAGE		-	VAR	4.1963	204.	1.9196	1.6489	4.4748		8.0433	2.1943	12.9506		
POWER BOOSTER		-	VAR	13.0429	721.	18.6071	3.4857	7.8812		29.9740	8.1772	48.2614		
BRAKE SYSTEM TUBING AND FITTING(WARNING LIGHT, PROP. VALVE)		-	VAR	6.7387	1035.	12.2823	4.0128	7.6210		23.9161	6.5248	38.5091		
PARKING BRAKE SYSTEM		-	VAR	9.8280	542.	3.4669	4.9044	7.1528		15.5241	4.2351	24.9955		
TOTAL		-	VAR	153.9031	5058.	64.6970	36.0063	71.9212		172.6245	47.0938	277.9458		

Item	FORD MOTOR COMPANY	Req'd Per Vehicle	Material	Weight	Total Tooling (\$000)	COST PER VEHICLE \$							Wholesale Cost	Dealer Markup	Consumer Cost
						VARIABLE COST									
						Material	Labor	Burden	Total						
1966 FORD FALCON															
FRONT BRAKE ASSEMBLY		-	VAR	51.9210	1585.	14.4535	11.8165	26.9541	53.2241	71.1766	14.5200	85.6966			
REAR BRAKE ASSEMBLY		-	VAR	34.8760	1515.	15.1449	6.9532	17.2799	39.3780	52.6602	10.7427	63.4029			
MASTER CYLINDER		-	VAR	3.5957	445.	0.7684	2.6064	4.9053	8.2801	11.0730	2.2589	13.3319			
FOOT PEDAL AND LINKAGE		-	VAR	2.1921	310.	1.4276	1.0992	2.1380	4.6648	6.2382	1.2726	7.5108			
POWER BOOSTER		-	-	-	-	-	-	-	-	-	-	-			
BRAKE SYSTEM TUBING AND FLITING(WARNING LIGHT, PROP. VALVE)		-	VAR	2.8092	580.	4.8545	2.1115	3.8765	10.8425	14.4997	2.9579	17.4576			
PARKING BRAKE SYSTEM		-	VAR	5.9269	1055.	3.6155	3.1615	3.7074	10.4844	14.0208	2.8602	16.8810			
TOTAL		-	VAR	101.3209	5490.	40.2644	27.7483	58.8612	126.8739	169.6685	34.6123	204.2808			
1968 FORD FALCON															
FRONT BRAKE ASSEMBLY		-	VAR	64.5232	1808.	13.8738	15.2550	35.4632	64.5920	86.3789	17.6213	104.0002			
REAR BRAKE ASSEMBLY		-	VAR	34.5214	1510.	13.9444	8.5663	20.8478	43.3585	57.9833	11.8286	69.8119			
MASTER CYLINDER		-	VAR	5.5876	555.	1.3518	3.2158	5.7531	10.3207	13.8019	2.8156	16.6175			
FOOT PEDAL AND LINKAGE		-	VAR	2.4773	310.	1.6717	1.0319	1.8164	4.5200	6.0446	1.2331	7.2777			
POWER BOOSTER		-	VAR	12.3018	2871.	10.4920	4.5624	8.0537	23.1081	30.9025	6.3041	37.2066			
BRAKE SYSTEM TUBING AND FITTING(WARNING LIGHT, PROP. VALVE)		-	VAR	4.2210	1285.	7.7850	3.7567	6.1421	17.6838	23.6485	4.8243	28.4728			
PARKING BRAKE SYSTEM		-	VAR	7.0065	1145.	4.2350	3.5143	4.1119	11.8612	15.8620	3.2358	19.0978			
TOTAL		-	VAR	130.6388	9484.	53.3537	39.9024	82.1882	175.4443	234.6217	47.8628	282.4845			
1976 FORD MAVERICK															
FRONT BRAKE ASSEMBLY		-	VAR	75.4538	1595.	13.1658	12.7376	28.8930	54.7964	73.2792	14.9490	88.2282			
REAR BRAKE ASSEMBLY		-	VAR	44.7396	1605.	15.9193	8.7902	21.0900	45.7995	61.2477	12.4945	73.7422			
MASTER CYLINDER		-	VAR	6.1250	515.	1.4111	3.2044	5.7145	10.3300	13.8143	2.8181	16.6324			
FOOT PEDAL AND LINKAGE		-	VAR	3.4434	430.	1.7784	0.7969	2.0109	4.5862	6.1331	1.2512	7.3843			
POWER BOOSTER		-	VAR	6.1475	785.	5.3186	2.1913	4.2318	11.7417	15.7022	3.2032	18.9054			
BRAKE SYSTEM TUBING AND FITTING(WARNING LIGHT, PROP. VALVE)		-	VAR	7.5051	840.	9.1590	3.6300	6.1786	18.9676	25.3654	5.1745	30.5399			
PARKING BRAKE SYSTEM		-	VAR	9.6230	1460.	5.6900	3.0303	3.0634	11.7837	15.7583	3.2147	18.9730			
TOTAL		-	VAR	153.0374	7230.	52.4422	34.3807	71.1822	158.0051	211.3002	43.1052	254.4054			

FMVSS - 105 HYDRAULIC BRAKE SYSTEM IN PASSENGER CARS SUMMARY OF COMPONENT COST AND WEIGHT DATA

Item	FORD MOTOR COMPANY	Req'd Per Vehicle	Material	Weight	Total Tooling (\$000)	COST PER VEHICLE \$							Wholesale Cost	Dealer Markup	Consumer Cost
						VARIABLE COST									
						Material	Labor	Burden	Total						
1966 FORD GALAXIE															
FRONT BRAKE ASSEMBLY		-	VAR	70.6634	1470.	20.2787	11.0218	27.8464	59.1469	79.0971	16.1359	95.2330			
REAR BRAKE ASSEMBLY		-	VAR	57.6818	1635.	20.9759	8.4903	22.1643	51.6305	69.0455	14.0852	83.1307			
MASTER CYLINDER		-	VAR	6.8572	550.	1.4138	3.3942	6.2560	11.0640	14.7959	3.0183	17.8142			
FOOT PEDAL AND LINKAGE		-	VAR	4.1919	480.	2.1771	0.8260	2.0987	5.1018	6.8226	1.3919	8.2145			
POWER BOOSTER		-	-	-	-	-	-	-	-	-	-	-			
BRAKE SYSTEM TUBING AND FITTING(WARNING LIGHT, PROP. VALVE)		-	VAR	3.6535	475.	5.9329	2.1957	4.2744	12.4030	16.5865	3.3837	19.9702			
PARKING BRAKE SYSTEM		-	VAR	5.8168	1150.	2.9620	3.6099	4.0437	10.6156	14.1962	2.8961	17.0923			
TOTAL		-	VAR	148.8646	5760.	53.7404	29.5379	66.6835	149.9618	200.5438	40.9111	241.4549			
1968 FORD GALAXIE															
FRONT BRAKE ASSEMBLY		-	VAR	77.9436	1788.	17.3644	13.0640	33.8047	64.2331	85.8989	17.5234	103.4223			
REAR BRAKE ASSEMBLY		-	VAR	57.6078	1615.	20.9312	8.4667	22.1277	51.5256	68.9052	14.0566	82.9618			
MASTER CYLINDER		-	VAR	7.0126	505.	1.4431	3.3937	6.2312	11.0680	14.8012	3.0194	17.8206			
FOOT PEDAL AND LINKAGE		-	VAR	4.1380	480.	1.5627	1.3610	2.7324	5.6561	7.5639	1.5430	9.1069			
POWER BOOSTER		-	VAR	13.4387	2591.	9.5430	3.8512	6.2726	19.6668	26.3004	5.3653	31.6657			
BRAKE SYSTEM TUBING AND FITTING(WARNING LIGHT, PROP. VALVE)		-	VAR	6.2672	1290.	7.7671	3.9897	8.2262	19.9830	26.7233	5.4515	32.1748			
PARKING BRAKE SYSTEM		-	VAR	7.4780	1200.	4.0280	3.1167	4.0277	11.1724	14.9409	3.0479	17.9888			
TOTAL		-	VAR	173.8859	9469.	62.6395	37.2430	83.4225	183.3050	245.1338	50.0071	295.1409			
1976 FORD GALAXIE															
FRONT BRAKE ASSEMBLY		-	VAR	93.0528	1675.	17.2211	11.6552	30.9864	59.8627	80.0544	16.3311	96.3855			
REAR BRAKE ASSEMBLY		-	VAR	75.6176	1815.	25.2408	9.0222	22.4060	56.6690	75.7835	15.4598	91.2433			
MASTER CYLINDER		-	VAR	7.1139	430.	1.6316	2.7778	5.5764	9.9858	13.3540	2.7242	16.0782			
FOOT PEDAL AND LINKAGE		-	VAR	7.8112	520.	4.1063	1.2805	2.5152	7.9020	10.5673	2.1558	12.7231			
POWER BOOSTER		-	VAR	12.1877	1890.	9.8249	3.3853	5.4809	18.6911	24.9956	5.0991	30.0947			
BRAKE SYSTEM TUBING AND FITTING(WARNING LIGHT, PROP. VALVE)		-	VAR	7.3575	1238.	10.0414	4.1995	8.8055	23.0464	30.8200	6.2872	37.1072			
PARKING BRAKE SYSTEM		-	VAR	7.7796	1245.	4.4157	3.4571	3.3786	11.2514	15.0465	3.0695	18.1160			
TOTAL		-	VAR	210.9203	8813.	72.4818	35.7776	79.1490	187.4084	250.6213	51.1267	301.7480			

Item	FORD MOTOR COMPANY	Req'd Per Vehicle	Material	Weight	Total Tooling (\$000)	COST PER VEHICLE \$							Consumer Cost
						VARIABLE COST				Whole- sale Cost	Dealer Markup		
									Total				
						Material	Labor	Burden					
1966 FORD LINCOLN CONTINENTAL													
FRONT BRAKE ASSEMBLY		-	VAR	80.4250	910.	19.0927	9.6901	25.1178	53.9006	72.0813	14.7046	86.7859	
REAR BRAKE ASSEMBLY		-	VAR	81.1556	815.	22.3407	9.2768	23.7434	55.3609	74.0341	15.1030	89.1371	
MASTER CYLINDER		-	VAR	5.8971	410.	1.1842	2.5780	4.9380	8.7002	11.6348	2.3735	14.0083	
FOOT PEDAL AND LINKAGE		-	VAR	5.6816	147.	1.8871	1.0719	2.5707	5.5297	7.3949	1.5085	8.9034	
POWER BOOSTER		-	VAR	7.0648	670.	5.3844	2.3692	4.7859	12.5395	16.7691	3.4209	20.1900	
BRAKE SYSTEM TUBING AND FITTING(WARNING LIGHT, PROP. VALVE)		-	VAR	6.2678	625.	10.5677	5.0805	10.9891	26.6373	35.6221	7.2669	42.8890	
PARKING BRAKE SYSTEM		-	VAR	9.7547	695.	4.2783	3.8503	4.8565	12.9851	17.3650	3.5424	20.9074	
TOTAL		-	VAR	196.2466	4272.	64.7351	33.9168	77.0014	175.6533	234.9013	47.9198	282.8210	
1968 FORD LINCOLN CONTINENTAL													
FRONT BRAKE ASSEMBLY		-	VAR	81.4056	695.	19.3193	9.4958	24.6300	53.4451	71.4721	14.5803	86.0524	
REAR BRAKE ASSEMBLY		-	VAR	75.0622	1040.	19.4233	8.8116	22.9077	51.1426	68.3930	13.9522	82.3452	
MASTER CYLINDER		-	VAR	6.9812	440.	1.6383	3.0999	7.0088	11.7470	15.7093	3.2047	18.9140	
FOOT PEDAL AND LINKAGE		-	VAR	5.7186	147.	1.8716	1.0719	2.5707	5.5142	7.3741	1.5044	8.8785	
POWER BOOSTER		-	VAR	9.8045	801.	7.6475	2.5082	5.0407	15.1964	20.3221	4.1458	24.4679	
BRAKE SYSTEM TUBING AND FITTING(WARNING LIGHT, PROP. VALVE)		-	VAR	6.7991	830.	10.7127	5.5073	12.2651	28.4851	38.0931	7.7710	45.8641	
PARKING BRAKE SYSTEM		-	VAR	9.1791	705.	4.1670	3.7760	6.8579	14.8009	19.7932	4.0379	23.8311	
TOTAL		-	VAR	194.9503	4658.	64.7797	34.2707	81.2809	180.3313	241.1569	49.1963	290.3532	
1976 FORD LINCOLN CONTINENTAL													
FRONT BRAKE ASSEMBLY		-	VAR	93.0688	1675.	17.0921	11.6552	30.9864	59.7337	79.8819	16.2959	96.1778	
REAR BRAKE ASSEMBLY		-	VAR	61.6370	954.	16.8096	10.6351	23.9572	51.4019	68.7898	14.0229	82.7627	
MASTER CYLINDER		-	VAR	6.9812	440.	1.6383	3.0999	7.0088	11.7470	15.7093	3.2047	18.9140	
FOOT PEDAL AND LINKAGE		-	VAR	3.7512	147.	1.5147	1.2994	2.7529	5.5670	7.4447	1.5188	8.9635	
POWER BOOSTER		-	VAR	13.9262	948.	12.7295	6.1291	12.3647	31.2233	41.7549	8.5180	50.2729	
BRAKE SYSTEM TUBING AND FITTING(WARNING LIGHT, PROP. VALVE)		-	VAR	6.4912	1058.	9.0605	3.6792	7.7046	20.4443	27.3402	5.5774	32.9176	
PARKING BRAKE SYSTEM		-	VAR	8.1485	783.	3.4757	5.1209	7.3075	15.9041	21.2686	4.3387	25.6073	
TOTAL		-	VAR	194.0041	6005.	62.3204	41.6188	92.0821	196.0213	262.1394	53.4764	315.6158	

FMVSS - 105 HYDRAULIC BRAKE SYSTEM IN PASSENGER CARS SUMMARY OF COMPONENT COST AND WEIGHT DATA

Item	GENERAL MOTORS CORPORATION	Req'd Per Vehicle	Material	Weight	Total Tooling (\$000)	COST PER VEHICLE \$							Consumer Cost
						VARIABLE COST			Total	Whole- sale Cost	Dealer Markup		
						Material	Labor	Burden					
1966 CHEVY II													
FRONT BRAKE ASSEMBLY		-	VAR	54.5760	934.	13.7318	9.4301	21.7363	44.8982	60.0424	12.2486	72.2910	
REAR BRAKE ASSEMBLY		-	VAR	44.0082	909.	11.4202	8.7237	19.3285	39.4724	52.7864	10.7685	63.5549	
MASTER CYLINDER		-	VAR	4.1474	282.	0.8617	2.3284	4.3669	7.5570	10.1060	2.0616	12.1676	
FOOT PEDAL AND LINKAGE		-	VAR	3.2644	205.	1.1555	1.8687	4.0035	7.0277	9.3981	1.9173	11.3154	
POWER BOOSTER		-	-	-	-	-	-	-	-	-	-	-	
BRAKE SYSTEM TUBING AND FITTING(WARNING LIGHT, PROP. VALVE)		-	VAR	3.5092	320.	5.9509	3.0146	5.9381	14.9036	19.9306	4.0658	23.9964	
PARKING BRAKE SYSTEM		-	VAR	5.3515	504.	1.8394	3.5510	18.9974	24.3878	32.6138	6.6532	39.2670	
TOTAL		-	VAR	114.8567	3154.	34.9595	28.9165	74.3707	138.2467	184.8773	37.7150	222.5923	
1968 CHEVY II													
FRONT BRAKE ASSEMBLY		-	VAR	56.0740	540.	11.8694	8.4626	20.8354	41.1674	55.0532	11.2308	66.2840	
REAR BRAKE ASSEMBLY		-	VAR	44.7914	874.	11.8846	8.5418	18.8737	39.3001	52.5560	10.7215	63.2775	
MASTER CYLINDER		-	VAR	5.9413	364.	1.2594	2.6894	7.4160	11.3648	15.1981	3.1005	18.2986	
FOOT PEDAL AND LINKAGE		-	VAR	3.2664	205.	1.1584	1.8869	4.0835	7.1288	9.5333	1.9448	11.4781	
POWER BOOSTER		-	VAR	9.7794	490.	5.3054	2.7764	5.0431	13.1249	17.5519	3.5806	21.1325	
BRAKE SYSTEM TUBING AND FITTING(WARNING LIGHT, PROP. VALVE)		-	VAR	8.4361	775.	10.0531	4.6926	9.3219	24.0676	32.1856	6.5659	38.7515	
PARKING BRAKE SYSTEM		-	VAR	6.0320	439.	2.2815	3.7774	6.2749	12.3338	16.4940	3.3648	19.8588	
TOTAL		-	VAR	134.3206	3687.	43.8118	32.8271	71.8485	148.4874	198.5721	40.5089	239.0810	
1976 CHEVROLET NOVA													
FRONT BRAKE ASSEMBLY		-	VAR	76.4768	672.	16.4297	8.4955	18.8068	43.7320	58.4828	11.9305	70.4133	
REAR BRAKE ASSEMBLY		-	VAR	47.0796	861.	11.7408	8.1950	18.1044	38.0402	50.8712	10.3777	61.2489	
MASTER CYLINDER		-	VAR	8.3765	296.	2.5349	2.2948	5.9185	10.7482	14.3736	2.9322	17.3058	
FOOT PEDAL AND LINKAGE		-	VAR	2.3272	95.	0.8178	0.9105	1.3944	3.1227	4.1760	0.8519	5.0279	
POWER BOOSTER		-	VAR	9.7450	568.	6.1445	2.4382	5.1759	13.7586	18.3994	3.7534	22.1528	
BRAKE SYSTEM TUBING AND FITTING(WARNING LIGHT, PROP. VALVE)		-	VAR	7.8148	695.	11.2237	4.7690	10.6865	26.6792	35.6781	7.2783	42.9564	
PARKING BRAKE SYSTEM		-	VAR	7.1573	478.	2.8631	4.1083	6.3940	13.3654	17.8735	3.6463	21.5198	
TOTAL		-	VAR	158.9772	3665.	51.7545	31.2113	66.4315	149.4463	199.8546	40.7703	240.6249	

FMVSS - 105 HYDRAULIC BRAKE SYSTEM IN PASSENGER CARS SUMMARY OF COMPONENT COST AND WEIGHT DATA

Item	GENERAL MOTORS CORPORATION	Req'd Per Vehicle	Material	Weight	Total Tooling (\$000)	COST PER VEHICLE \$						Wholesale Cost	Dealer Markup	Consumer Cost
						VARIABLE COST								
						Material	Labor	Burden	Total					
1966 CHEVROLET CHEVELLE														
FRONT BRAKE ASSEMBLY		-	VAR	32.0852	919.	13.6640	9.3053	21.3043	44.2736	59.2071	12.0782	71.2853		
REAR BRAKE ASSEMBLY		-	VAR	43.7756	886.	11.2500	8.8375	20.0849	40.1724	53.7226	10.9594	64.6820		
MASTER CYLINDER		-	VAR	4.0974	282.	0.8295	2.1009	4.1847	7.1151	9.5150	1.9411	11.4561		
FOOT PEDAL AND LINKAGE		-	VAR	2.7441	115.	0.9572	1.3532	3.0583	5.3687	7.1796	1.4646	8.6442		
POWER BOOSTER		-	VAR	8.8790	485.	5.8197	2.3392	4.5954	12.7543	17.0563	3.4795	20.5358		
BRAKE SYSTEM TUBING AND FITTING(WARNING LIGHT, PROP. VALVE)		-	VAR	3.9553	340.	6.2639	2.5693	4.4653	13.2985	17.7841	3.6279	21.4120		
PARKING BRAKE SYSTEM		-	VAR	4.5841	508.	1.8608	4.0944	6.4127	12.3679	16.5396	3.3741	19.9137		
TOTAL		-	VAR	100.1207	3535.	40.6451	30.5998	64.1056	135.3505	181.0043	36.9248	217.9291		
1968 CHEVROLET CHEVELLE														
FRONT BRAKE ASSEMBLY		-	VAR	45.7713	405.	10.8831	7.1510	16.9281	34.9622	46.7550	9.5380	56.2930		
REAR BRAKE ASSEMBLY		-	VAR	43.4894	886.	11.2298	8.7871	19.9376	39.9545	53.4312	10.8999	64.3311		
MASTER CYLINDER		-	VAR	5.9474	374.	1.2624	3.1931	7.5532	12.0087	16.0592	3.2761	19.3353		
FOOT PEDAL AND LINKAGE		-	VAR	2.8661	100.	0.8583	1.2098	2.7331	4.8012	6.4206	1.3099	7.7305		
POWER BOOSTER		-	VAR	9.3981	458.	6.6397	2.3094	4.9093	13.8584	18.5328	3.7807	22.3135		
BRAKE SYSTEM TUBING AND FITTING(WARNING LIGHT, PROP. VALVE)		-	VAR	5.1268	495.	7.5414	3.2665	5.9506	16.7585	22.4111	4.5719	26.9830		
PARKING BRAKE SYSTEM		-	VAR	5.7447	555.	2.3619	4.1186	6.3225	12.8030	17.1215	3.4927	20.6142		
TOTAL		-	VAR	118.3438	3273.	40.7766	30.0355	64.3344	135.1465	180.7314	36.8692	217.6006		
1976 CHEVROLET CHEVELLE														
FRONT BRAKE ASSEMBLY		-	VAR	70.1924	672.	12.0111	7.5509	15.4195	34.9815	46.7808	9.5432	56.3240		
REAR BRAKE ASSEMBLY		-	VAR	57.9654	854.	14.4057	8.4303	18.5274	41.3634	55.3153	11.2843	66.5996		
MASTER CYLINDER		-	VAR	8.9003	312.	1.7968	2.9088	6.2212	10.9268	14.6124	2.9809	17.5933		
FOOT PEDAL AND LINKAGE		-	VAR	2.5382	95.	0.7448	0.9609	1.9383	3.6440	4.8731	0.9941	5.8672		
POWER BOOSTER		-	VAR	12.2301	610.	7.8463	2.3416	4.5422	14.7301	19.6986	4.0185	23.7171		
BRAKE SYSTEM TUBING AND FITTING(WARNING LIGHT, PROP. VALVE)		-	VAR	6.2521	655.	9.2456	4.7270	10.6111	24.5837	32.8758	6.7066	39.5824		
PARKING BRAKE SYSTEM		-	VAR	5.7354	496.	13.0602	4.5015	6.6603	24.2220	32.3921	6.6080	39.0001		
TOTAL		-	VAR	163.8139	3694.	59.1105	31.4210	63.9200	154.4515	206.5481	42.1356	248.6837		

FMVSS - 105 HYDRAULIC BRAKE SYSTEM IN PASSENGER CARS SUMMARY OF COMPONENT COST AND WEIGHT DATA

Item	GENERAL MOTORS CORPORATION	Req'd Per Vehicle	Material	Weight	Total Tooling (\$000)	COST PER VEHICLE \$							Dealer Markup	Consumer Cost
						VARIABLE COST			Total	Whole- sale Cost				
						Material	Labor					Burden		
1966 CHEVROLET CAPRICE														
FRONT BRAKE ASSEMBLY		-	VAR	63.9356	901.	16.7762	9.6587	21.8185	48.2534	64.5293	13.1639	77.6932		
REAR BRAKE ASSEMBLY		-	VAR	54.8572	901.	13.2225	8.6222	19.0613	40.9060	54.7036	11.1595	65.8631		
MASTER CYLINDER		-	VAR	4.0974	282.	0.8295	2.1009	4.1847	7.1151	9.5150	1.9411	11.4561		
FOOT PEDAL AND LINKAGE		-	VAR	2.7271	165.	1.0528	1.0248	2.7106	4.7882	6.4033	1.3062	7.7095		
POWER BOOSTER		-	VAR	6.2723	441.	5.4109	2.2364	4.5560	12.2033	16.3195	3.3291	19.6486		
BRAKE SYSTEM TUBING AND FITTING(WARNING LIGHT, PROP. VALVE)		-	VAR	4.4640	375.	6.7364	2.7300	5.2194	14.6858	19.6393	4.0064	23.6457		
PARKING BRAKE SYSTEM		-	VAR	6.2661	608.	2.5576	4.1953	6.7012	13.4541	17.9922	3.6704	21.6626		
TOTAL		-	VAR	142.6197	3673.	46.5859	30.5683	64.2517	141.4059	189.1022	38.5766	227.6788		
1968 CHEVROLET CAPRICE														
FRONT BRAKE ASSEMBLY		-	VAR	75.9125	615.	13.1079	7.0076	15.6824	35.7979	47.8725	9.7660	57.6385		
REAR BRAKE ASSEMBLY		-	VAR	54.8572	901.	13.2225	8.6222	19.0613	40.9060	54.7036	11.1595	65.8631		
MASTER CYLINDER		-	VAR	5.9411	366.	1.2594	3.2705	8.5387	13.0686	17.4766	3.5653	21.0419		
FOOT PEDAL AND LINKAGE		-	VAR	2.7271	165.	1.0595	1.0612	2.7915	4.9122	6.5691	1.3401	7.9092		
POWER BOOSTER		-	VAR	8.9652	456.	6.5019	2.2458	4.6044	13.3521	17.8558	3.6425	21.4983		
BRAKE SYSTEM TUBING AND FITTING(WARNING LIGHT, PROP. VALVE)		-	VAR	6.1339	495.	7.9387	3.5263	6.8314	18.2964	24.4678	4.9914	29.4592		
PARKING BRAKE SYSTEM		-	VAR	6.4080	645.	2.4787	4.2375	6.8172	13.5334	18.0982	3.6921	21.7903		
TOTAL		-	VAR	160.9450	3643.	45.5686	29.9711	64.3269	139.8666	187.0436	38.1569	225.2005		
1976 CHEVROLET CAPRICE														
FRONT BRAKE ASSEMBLY		-	VAR	79.6204	667.	13.4076	6.3605	14.0210	33.7891	45.1862	9.2179	54.4041		
REAR BRAKE ASSEMBLY		-	VAR	60.2826	899.	13.8901	8.5868	19.0476	41.5245	55.5307	11.3283	66.8590		
MASTER CYLINDER		-	VAR	8.3764	301.	1.7751	2.8383	6.0007	10.6141	14.1942	2.8957	17.0899		
FOOT PEDAL AND LINKAGE		-	VAR	2.8958	77.	1.3818	0.9524	1.3694	3.7036	4.9528	1.0104	5.9632		
POWER BOOSTER		-	VAR	12.1573	685.	7.2226	2.3524	4.7124	14.2874	19.1065	3.8978	23.0043		
BRAKE SYSTEM TUBING AND FITTING(WARNING LIGHT, PROP. VALVE)		-	VAR	6.3063	565.	9.2148	4.6392	10.4853	24.3393	32.5489	6.6400	39.1889		
PARKING BRAKE SYSTEM		-	VAR	6.6177	468.	2.8144	4.5505	6.9780	14.3429	19.1808	3.9128	23.0936		
TOTAL		-	VAR	176.2565	3662.	49.7064	30.2801	62.6144	142.6009	190.7001	38.9029	229.6030		

Item	GENERAL MOTORS CORPORATION	Req'd Per Vehicle	Material	Weight	Total Tooling (\$000)	COST PER VEHICLE \$						
						VARIABLE COST				Whole- sale Cost	Dealer Markup	Consumer Cost
						Material	Labor	Burden	Total			
1966 PONTIAC BONNEVILLE												
FRONT BRAKE ASSEMBLY		-	VAR	73.3726	1043.	17.3388	9.5564	22.0054	48.9006	65.3948	13.3405	78.7353
REAR BRAKE ASSEMBLY		-	VAR	54.4610	769.	14.3742	8.8557	19.6117	42.8416	57.2921	11.6876	68.9797
MASTER CYLINDER		-	VAR	4.0537	204.	0.8406	2.1521	4.2457	7.2384	9.6799	1.9747	11.6546
FOOT PEDAL AND LINKAGE		-	VAR	3.7374	105.	1.4279	1.0837	2.3484	4.8600	6.4993	1.3258	7.8251
POWER BOOSTER		-	VAR	7.8704	554.	5.8527	2.5317	5.1308	13.5152	18.0739	3.6870	21.7609
BRAKE SYSTEM TUBING AND FITTING(WARNING LIGHT, PROP. VALVE)		-	VAR	3.8471	345.	6.0999	2.6200	4.9012	13.6211	18.2155	3.7160	21.9315
PARKING BRAKE SYSTEM		-	VAR	6.2351	637.	2.3814	3.9761	6.4857	12.8432	17.1752	3.5038	20.6790
TOTAL												
1968 PONTIAC BONNEVILLE												
FRONT BRAKE ASSEMBLY		-	VAR	73.5442	730.	15.1723	10.2836	25.5321	50.9880	68.1863	13.9099	82.0962
REAR BRAKE ASSEMBLY		-	VAR	62.9158	769.	14.8833	8.7574	19.5316	43.1723	57.7342	11.7778	69.5121
MASTER CYLINDER		-	VAR	7.6386	287.	1.6488	2.6055	5.2559	9.5102	12.7180	2.5945	15.3125
FOOT PEDAL AND LINKAGE		-	VAR	3.8274	120.	1.4209	1.1137	2.3962	4.9308	6.5940	1.3451	7.3991
POWER BOOSTER		-	VAR	8.8455	517.	4.1481	1.6763	3.7039	9.5283	12.7422	2.5994	15.3416
BRAKE SYSTEM TUBING AND FITTING(WARNING LIGHT, PROP. VALVE)		-	VAR	4.9065	385.	6.4569	2.6684	5.8707	14.9960	20.0542	4.0910	24.1452
PARKING BRAKE SYSTEM		-	VAR	6.0088	610.	2.4666	4.2650	6.4083	13.1399	17.5720	3.5847	21.1567
TOTAL		-	VAR	167.6868	3418.	46.1969	31.3699	68.6987	146.2655	195.6010	39.9024	235.5034
1976 PONTIAC BONNEVILLE												
FRONT BRAKE ASSEMBLY		-	VAR	93.9174	667.	15.0563	6.5995	14.6185	36.2743	48.5096	9.8960	58.4056
REAR BRAKE ASSEMBLY		-	VAR	62.2714	894.	15.3631	8.3740	18.5081	42.2452	56.4945	11.5249	68.0194
MASTER CYLINDER		-	VAR	8.3765	301.	1.7749	2.8383	6.0007	10.6139	14.1940	2.8955	17.0895
FOOT PEDAL AND LINKAGE		-	VAR	2.8958	77.	1.3818	0.9524	1.3694	3.7036	4.9528	1.0104	5.9632
POWER BOOSTER		-	VAR	11.7513	665.	4.2992	1.3824	2.8449	8.5265	11.4025	2.3261	13.7286
BRAKE SYSTEM TUBING AND FITTING(WARNING LIGHT, PROP. VALVE)		-	VAR	6.2957	585.	9.2599	4.6070	10.3753	24.2422	32.4191	6.6135	39.0326
PARKING BRAKE SYSTEM		-	VAR	6.5281	467.	2.7580	4.2226	6.5884	13.5690	18.1458	3.7018	21.8476
TOTAL		-	VAR	190.0163	3656.	49.8932	28.9762	60.3053	139.1747	186.1183	37.9682	224.0865

FMVSS - 105 HYDRAULIC BRAKE SYSTEM IN PASSENGER CARS SUMMARY OF COMPONENT COST AND WEIGHT DATA

Item	GENERAL MOTORS CORPORATION	Req'd Per Vehicle	Material	Weight	Total Tooling (\$000)	COST PER VEHICLE \$							Wholesale Cost	Dealer Markup	Consumer Cost	
						VARIABLE COST			Total	Burden	Total	Total				
						Material	Labor	Burden								
1966 BUICK ELECTRA																
FRONT BRAKE ASSEMBLY		-	VAR	86.0718	894.	17.7132	8.5846	21.1574	47.4552	63.4618	12.9463	76.4081				
REAR BRAKE ASSEMBLY		-	VAR	86.3834	879.	21.6971	8.5809	18.8677	49.1457	65.7225	13.4074	79.1299				
MASTER CYLINDER		-	VAR	3.5409	358.	0.7840	2.3217	4.9243	8.0300	10.7385	2.1907	12.9292				
FOOT PEDAL AND LINKAGE		-	VAR	3.6215	105.	1.1179	1.1500	2.6023	4.8702	6.5129	1.3287	7.8416				
POWER BOOSTER		-	VAR	8.0129	516.	8.9741	1.9282	4.2303	15.1326	20.2368	4.1283	24.3651				
BRAKE SYSTEM TUBING AND FITTING(WARNING LIGHT, PROP. VALVE)		-	VAR	4.3029	375.	7.7811	2.6461	4.9317	15.3589	20.5395	4.1900	24.7295				
PARKING BRAKE SYSTEM		-	VAR	6.9702	496.	3.0882	4.1818	6.3418	13.6118	18.2031	3.7134	21.9165				
TOTAL		-	VAR	198.9036	3623.	61.1556	29.3933	63.0555	153.6044	205.4151	41.9048	247.3199				
1968 BUICK ELECTRA																
FRONT BRAKE ASSEMBLY		-	VAR	75.3826	654.	18.3878	11.5648	34.6670	64.6196	86.4158	17.6288	104.0446				
REAR BRAKE ASSEMBLY		-	VAR	86.3834	879.	21.6971	8.5809	18.8677	49.1457	65.7225	13.4074	79.1299				
MASTER CYLINDER		-	VAR	5.9556	372.	1.2542	2.3297	5.0059	8.5898	11.4871	2.3434	13.8305				
FOOT PEDAL AND LINKAGE		-	VAR	3.6157	90.	1.0460	1.1301	2.2511	4.4272	5.9205	1.2078	7.1283				
POWER BOOSTER		-	VAR	9.4405	499.	10.3053	1.8599	4.1701	16.3353	21.8452	4.4564	26.3016				
BRAKE SYSTEM TUBING AND FITTING(WARNING LIGHT, PROP. VALVE)		-	VAR	5.6007	465.	8.4683	3.2882	6.0907	17.8472	23.8671	4.8688	28.7359				
PARKING BRAKE SYSTEM		-	VAR	6.9702	496.	3.0882	4.1818	6.3418	13.6118	18.2031	3.7134	21.9165				
TOTAL		-	VAR	193.3487	3455.	64.2469	32.9354	77.3943	174.5766	233.4613	47.6260	281.0873				
1976 BUICK ELECTRA																
FRONT BRAKE ASSEMBLY		-	VAR	79.8704	667.	13.5492	6.5769	14.5885	34.7146	46.4238	9.4705	55.8943				
REAR BRAKE ASSEMBLY		-	VAR	58.8074	899.	14.5568	8.4013	18.6115	41.5696	55.5910	11.3406	66.9316				
MASTER CYLINDER		-	VAR	8.4096	301.	1.7948	2.8639	6.0631	10.7218	14.3383	2.9250	17.2633				
FOOT PEDAL AND LINKAGE		-	VAR	2.8958	77.	1.3818	0.9524	1.3694	3.7036	4.9528	1.0104	5.9632				
POWER BOOSTER		-	VAR	12.5734	681.	10.4485	1.6143	3.2711	15.3339	20.5060	4.1833	24.6893				
BRAKE SYSTEM TUBING AND FITTING(WARNING LIGHT, PROP. VALVE)		-	VAR	6.2449	575.	9.4483	4.6587	10.4942	24.6012	32.8992	6.7114	39.6106				
PARKING BRAKE SYSTEM		-	VAR	5.6895	473.	2.2888	4.0564	6.3978	12.7430	17.0412	3.4750	20.5162				
TOTAL		-	VAR	172.4084	3673.	53.4682	29.1239	60.7956	143.3877	191.7523	39.1162	230.8685				

FMVSS - 105 HYDRAULIC BRAKE SYSTEM IN PASSENGER CARS SUMMARY OF COMPONENT COST AND WEIGHT DATA

Item	TOYOTA	Req'd Per Vehicle	Material	Weight	Total Tooling (\$000)	COST PER VEHICLE \$							Dealer Markup	Consumer Cost
						VARIABLE COST				Whole- sale Cost				
									Total					
						Material	Labor	Burden						
1968	COROLLA													
	FRONT BRAKE ASSEMBLY	-	VAR	28.1090	629.	8.6660	7.1963	17.1452	33.0075	44.1409	9.0048	53.1457		
	REAR BRAKE ASSEMBLY	-	VAR	19.5126	634.	5.4520	7.7703	17.1619	30.3842	40.6328	8.2891	48.9219		
	MASTER CYLINDER	-	VAR	4.8920	488.	1.6300	4.3584	9.6245	15.6129	20.8791	4.2594	25.1385		
	FOOT PEDAL AND LINKAGE	-	VAR	1.8863	140.	0.7069	1.1283	2.2796	4.1148	5.5027	1.1226	6.6253		
	POWER BOOSTER	-	-	-	-	-	-	-	-	-	-	-		
	BRAKE SYSTEM TUBING AND FITTING(WARNING LIGHT, PROP. VALVE)	-	VAR	2.7776	205.	5.8899	2.1320	2.5920	10.6139	14.1940	2.8955	17.0895		
	PARKING BRAKE SYSTEM	-	VAR	2.7484	408.	1.5391	4.1911	6.3632	12.0934	16.1725	3.2992	19.4717		
	TOTAL	-	VAR	59.9259	2504.	23.8839	26.7764	55.1664	105.8267	141.5220	28.8706	170.3926		
1976	COROLLA													
	FRONT BRAKE ASSEMBLY	-	VAR	39.1865	677.	12.1556	8.3676	18.6423	39.1655	52.3760	10.6847	63.0607		
	REAR BRAKE ASSEMBLY	-	VAR	37.9272	814.	10.8415	8.3556	17.3960	36.5931	48.9360	9.9829	58.9189		
	MASTER CYLINDER	-	VAR	3.1670	487.	1.1529	2.7028	5.8739	9.7296	13.0114	2.6543	15.6657		
	FOOT PEDAL AND LINKAGE	-	VAR	2.5439	140.	1.0993	0.6699	1.9036	3.6728	4.9116	1.0020	5.9136		
	POWER BOOSTER	-	VAR	8.9264	501.	9.2205	3.3958	6.7727	19.3890	25.9289	5.2895	31.2184		
	BRAKE SYSTEM TUBING AND FITTING(WARNING LIGHT, PROP. VALVE)	-	VAR	4.1358	540.	5.2539	4.2184	10.1307	19.6030	26.2151	5.3479	31.5630		
	PARKING BRAKE SYSTEM	-	VAR	3.0214	427.	1.5657	4.1785	6.2601	12.0043	16.0534	3.2748	19.3282		
	TOTAL	-	VAR	98.9082	3586.	41.2894	31.8886	66.9793	140.1573	187.4324	38.2361	225.6685		
1966	CORONA													
	FRONT BRAKE ASSEMBLY	-	VAR	34.8674	919.	9.4141	8.2820	19.0286	36.7247	49.1119	10.0189	59.1308		
	REAR BRAKE ASSEMBLY	-	VAR	33.6232	906.	9.4668	7.2243	16.1174	32.8085	43.8748	8.9505	52.8253		
	MASTER CYLINDER	-	VAR	1.6723	405.	0.4642	2.2167	3.3968	6.0777	8.1277	1.6581	9.7858		
	FOOT PEDAL AND LINKAGE	-	VAR	2.4797	150.	0.9233	1.3547	2.8737	5.1517	6.8894	1.4054	8.2948		
	POWER BOOSTER	-	-	-	-	-	-	-	-	-	-	-		
	BRAKE SYSTEM TUBING AND FITTING(WARNING LIGHT, PROP. VALVE)	-	VAR	3.3872	360.	5.6012	3.2759	7.4995	16.3766	21.9004	4.4677	26.3681		
	PARKING BRAKE SYSTEM	-	VAR	6.9702	540.	3.0882	4.1818	6.3418	13.6118	18.2031	3.7134	21.9165		
	TOTAL	-	VAR	81.3277	3280.	28.9578	26.5354	55.2578	110.7510	148.1073	30.2140	178.3213		

FMVSS - 105 HYDRAULIC BRAKE SYSTEM IN PASSENGER CARS SUMMARY OF COMPONENT COST AND WEIGHT DATA

[illegible]

FMVSS - 105 HYDRAULIC BRAKE SYSTEM IN PASSENGER CARS SUMMARY OF COMPONENT COST AND WEIGHT DATA

Item	VOLKSWAGEN	Req'd Per Vehicle	Material	Weight	Total Tooling (\$000)	COST PER VEHICLE \$							Consumer Cost
						VARIABLE COST			Whole- sale Cost	Dealer Markup			
						Material	Labor	Burden				Total	
1966 BEETLE													
FRONT BRAKE ASSEMBLY		-	VAR	33.4366	735.	9.4320	8.8476	22.0276	40.3072	53.9028	10.9962	64.8990	
REAR BRAKE ASSEMBLY		-	VAR	32.0772	805.	10.2095	9.3489	22.4842	42.0426	56.2236	11.4696	67.6932	
MASTER CYLINDER		-	VAR	1.6723	405.	0.4642	2.2167	3.8048	6.4857	8.6733	1.7694	10.4427	
FOOT PEDAL AND LINKAGE		-	VAR	1.8559	210.	0.9696	1.3606	4.1316	6.4618	8.6414	1.7628	10.4042	
POWER BOOSTER		-	-	-	-	-	-	-	-	-	-	-	
BRAKE SYSTEM TUBING AND FITTING(WARNING LIGHT, PROP. VALVE)		-	VAR	1.9322	145.	5.4603	2.9215	2.7758	11.1576	14.9211	3.0439	17.9650	
PARKING BRAKE SYSTEM		-	VAR	2.7650	410.	1.4382	3.0752	4.6081	9.1215	12.1982	2.4884	14.6866	
TOTAL		-	VAR	73.7392	2710.	27.9738	27.7705	59.8321	115.5764	154.5604	31.5303	186.0907	
1968 BEETLE													
FRONT BRAKE ASSEMBLY		-	VAR	39.9366	750.	10.8845	8.3925	21.6632	40.9402	54.7493	11.1689	65.9182	
REAR BRAKE ASSEMBLY		-	VAR	37.4522	875.	10.8222	9.6890	23.2344	43.7456	58.5010	11.9342	70.4352	
MASTER CYLINDER		-	VAR	2.9530	620.	0.9188	4.0312	8.1646	13.1146	17.5382	3.5777	21.1159	
FOOT PEDAL AND LINKAGE		-	VAR	1.7951	200.	0.8607	1.3606	4.1316	6.3529	8.4960	1.7329	10.2289	
POWER BOOSTER		-	-	-	-	-	-	-	-	-	-	-	
BRAKE SYSTEM TUBING AND FITTING(WARNING LIGHT, PROP. VALVE)		-	VAR	1.9003	160.	5.4489	3.9170	3.2996	12.6655	16.9376	3.4552	20.3928	
PARKING BRAKE SYSTEM		-	VAR	2.6396	385.	1.3825	3.0169	4.4225	8.8219	11.7975	2.4067	14.2042	
TOTAL		-	VAR	86.6768	2990.	30.3176	30.4072	64.9159	125.6407	168.0196	34.2756	202.2952	
1976 BEETLE													
FRONT BRAKE ASSEMBLY		-	VAR	39.9366	740.	10.8981	8.7171	21.5053	41.1205	54.9904	11.2181	66.2085	
REAR BRAKE ASSEMBLY		-	VAR	37.6414	835.	10.7517	9.7163	23.4712	43.9392	58.7599	11.9870	70.7469	
MASTER CYLINDER		-	VAR	2.9098	620.	0.9021	4.0170	8.1201	13.0392	17.4373	3.5572	20.9945	
FOOT PEDAL AND LINKAGE		-	VAR	1.8559	210.	0.8323	1.3606	4.1316	6.3245	8.4578	1.7253	10.1831	
POWER BOOSTER		-	-	-	-	-	-	-	-	-	-	-	
BRAKE SYSTEM TUBING AND FITTING(WARNING LIGHT, PROP. VALVE)		-	VAR	1.9201	155.	5.3864	3.3026	2.6165	11.3055	15.1188	3.0843	18.2031	
PARKING BRAKE SYSTEM		-	VAR	2.5253	435.	1.5589	3.5605	4.9013	10.0207	13.4007	2.7337	16.1344	
TOTAL		-	VAR	86.7891	2995.	30.3295	30.6741	64.7461	125.7496	168.1649	34.3056	202.4705	

APPENDIX B

PHOTOGRAPHS

BRAKES

TABLE OF CONTENTS

	PAGE
AMERICAN MOTORS	
1966 AMERICAN RAMBLER	4
1968 AMERICAN RAMBLER	10
1976 AMERICAN RAMBLER	16
CHRYSLER CORPORATION	
1966 VALIANT	22
1968 VALIANT	28
1976 VALIANT	34
1966 FURY	40
1968 FURY	46
1976 FURY	52
FORD MOTOR COMPANY	
1966 FALCON	58
1968 FALCON	64
1976 MAVERICK	70
1966 LINCOLN CONTINENTAL	76
1968 LINCOLN CONTINENTAL	82
1976 LINCOLN CONTINENTAL	88
1966 GALAXIE	94
1968 GALAXIE	100
1976 GALAXIE	106
GENERAL MOTORS CORPORATION	
1966 CHEVROLET CHEVY II	112
1968 CHEVROLET CHEVY II	118
1976 CHEVROLET NOVA	124

	PAGE
GENERAL MOTORS CORPORATION	
1966 CHEVROLET CHEVELLE	130
1968 CHEVROLET CHEVELLE	136
1976 CHEVROLET CHEVELLE	142
1966 CHEVROLET CAPRICE	148
1968 CHEVROLET CAPRICE	154
1976 CHEVROLET CAPRICE	160
1966 PONTIAC BONNEVILLE	166
1968 PONTIAC BONNEVILLE	172
1976 PONTIAC BONNEVILLE	178
1966 BUICK ELECTRA	184
1968 BUICK ELECTRA	190
1976 BUICK ELECTRA	196
TOYOTA	
1966 CORONA	202
1968 CORONA	208
1976 CORONA	214
1968 COROLLA	220
1976 COROLLA	226
VOLKSWAGEN	
1966 BEETLE	232
1968 BEETLE	238
1976 BEETLE	244



1966 AMC AMERICAN RAMBLER
FRONT DRUM BRAKE ASSY



1966 AMC AMERICAN RAMBLER
REAR DRUM BRAKE ASSY



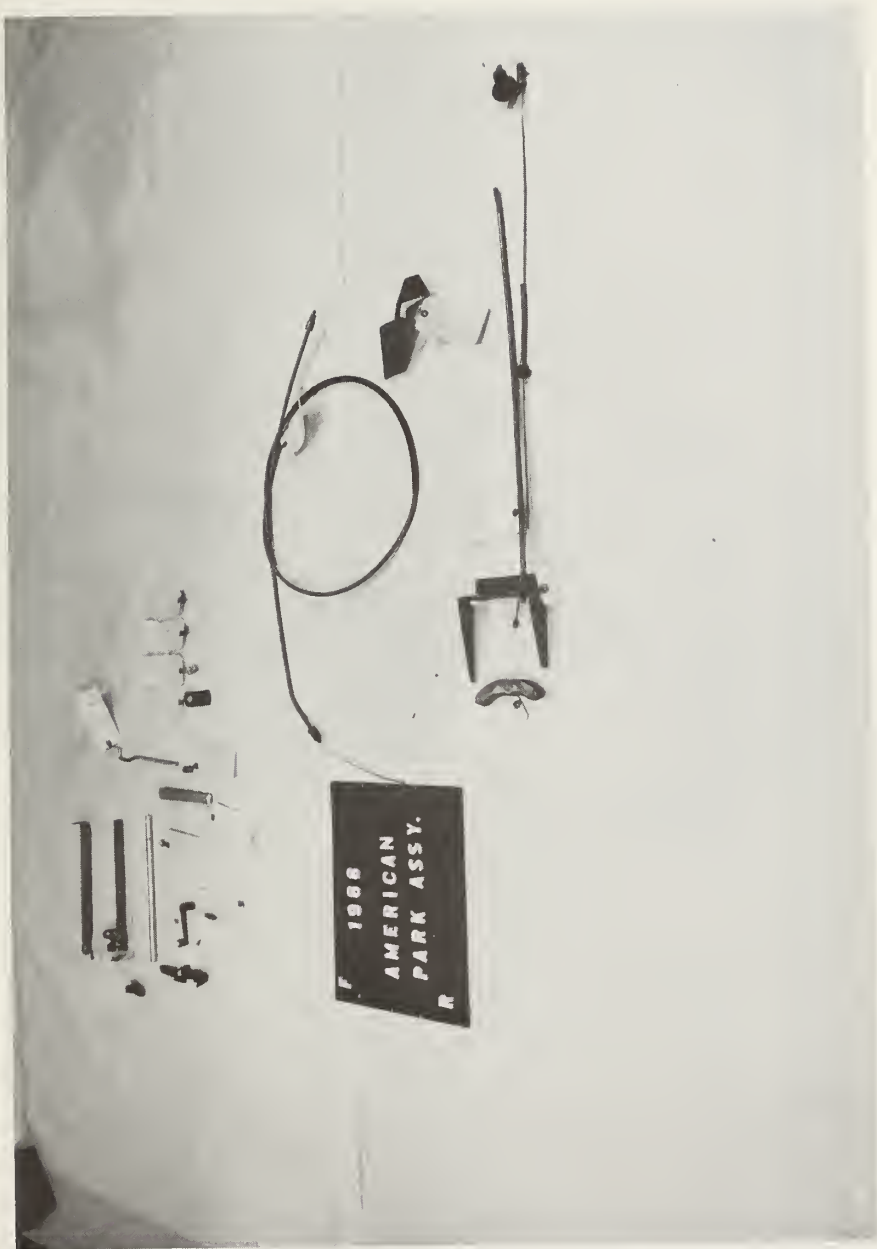
1966 AMC AMERICAN RAMBLER
MASTER CYLINDER ASSY
BRAKE PEDAL ASSY
POWER BOOSTER ASSY



1966 AMC AMERICAN RAMBLER
FRONT BRAKE HYD. LINES & HOSES



1966 AMC AMERICAN RAMBLER
REAR BRAKE HYD. LINES & HOSE



1966 AMC AMERICAN RAMBLER
PARK BRAKE ASSY & CABLES



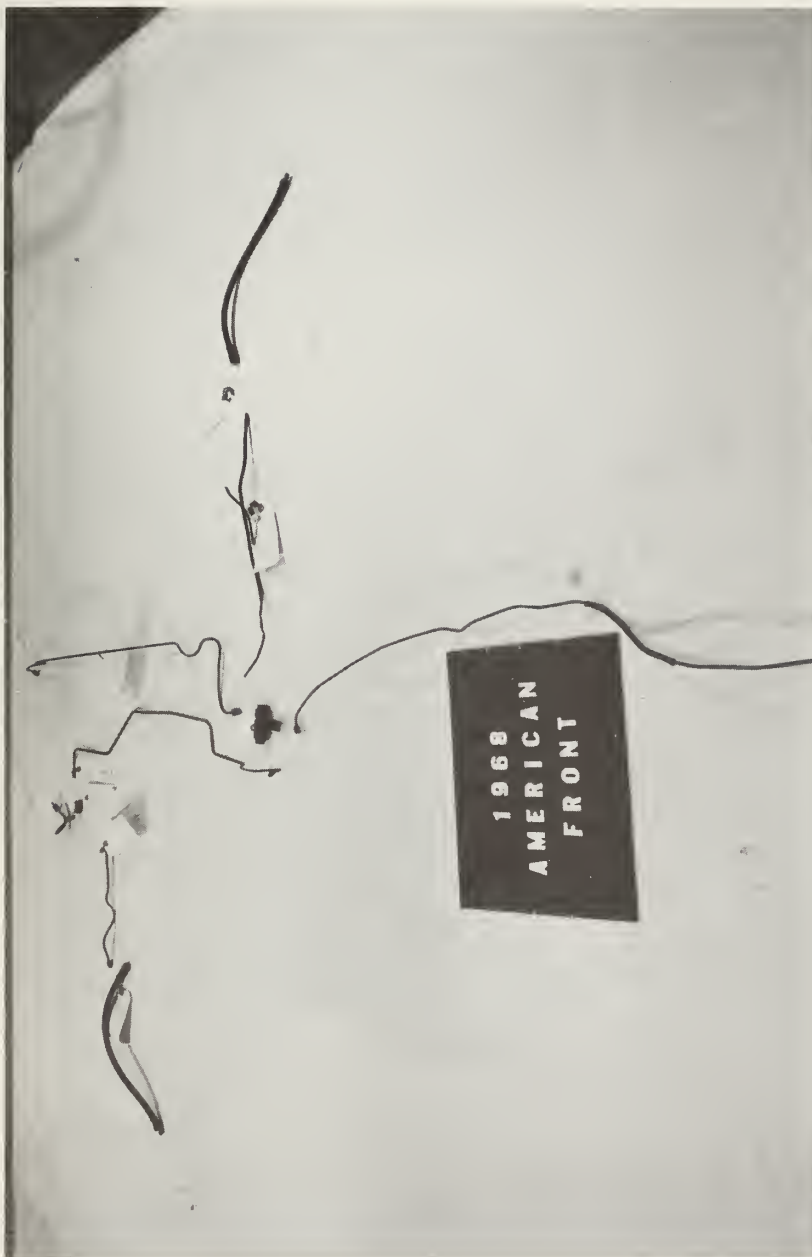
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FRONT DRUM BRAKE ASSY



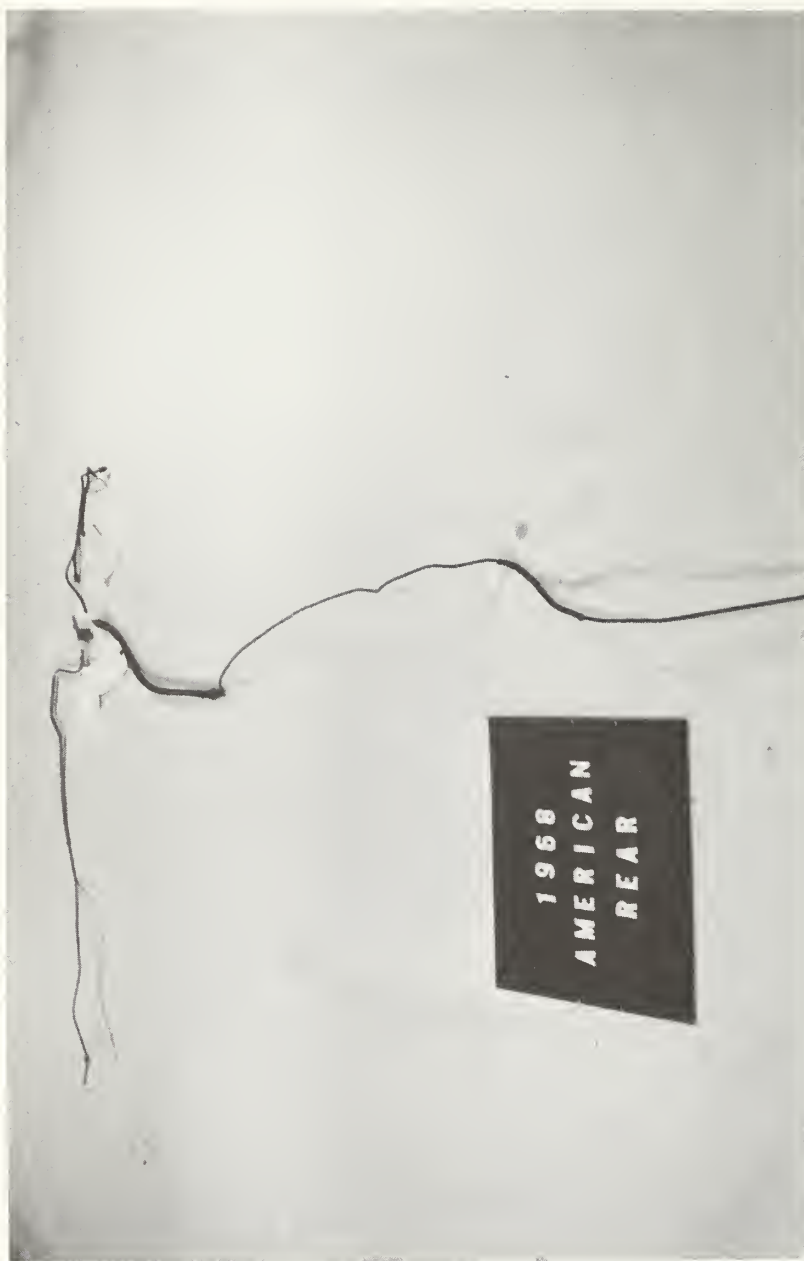
1968 AMC AMERICAN RAMBLER
REAR DRUM BRAKE ASSY



1968 AMC AMERICAN RAMBLER
MASTER CYLINDER ASSY
BRAKE PEDAL ASSY
POWER BOOSTER ASSY



1968 AMC AMERICAN RAMBLER
FRONT BRAKE HYD. LINES &
HOSES & PRESSURE VALVE



1968 AMC AMERICAN RAMBLER
REAR BRAKE HYD. LINES & HOSE



1968 AMC AMERICAN RAMBLER
PARK BRAKE ASSY & CABLES



1976 AMC GREMLIN
FRONT BRAKE ASSY



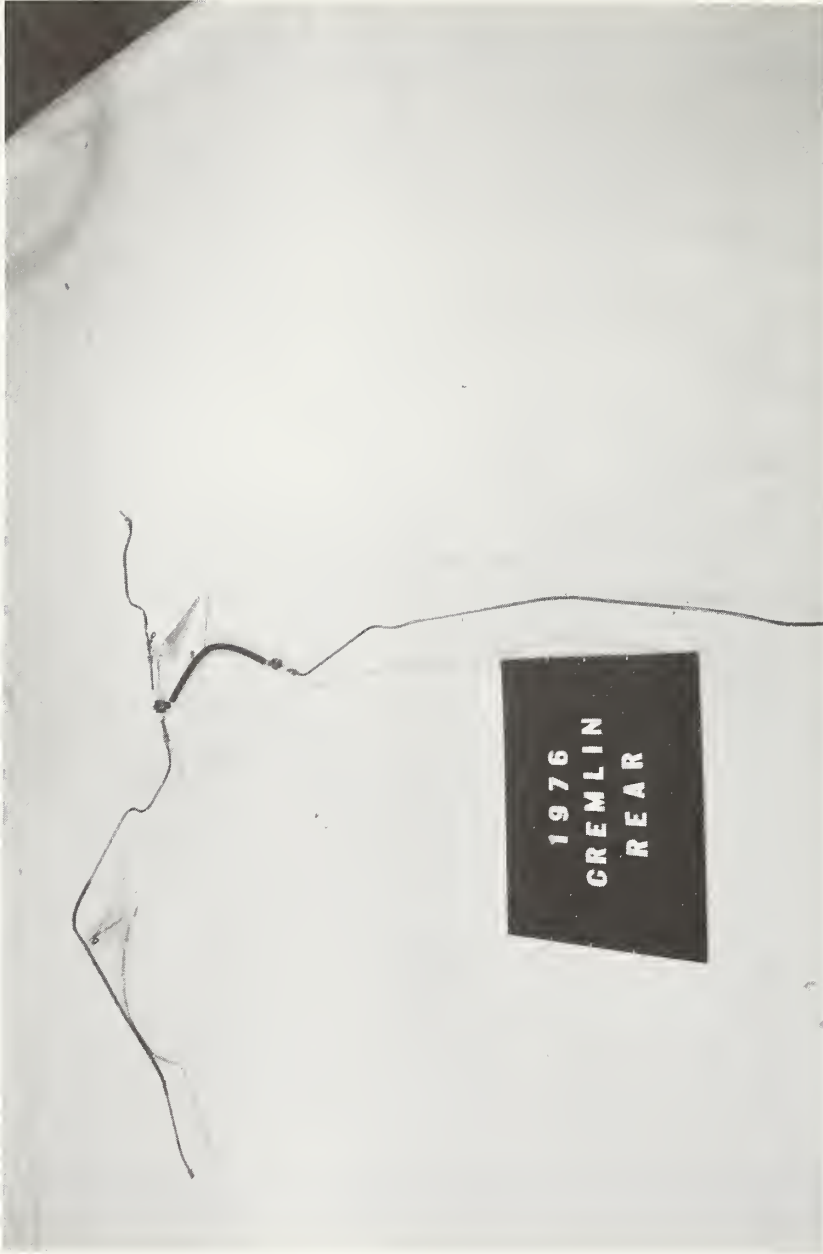
1976 AMC GREMLIN
REAR DRUM BRAKE ASSY



1976 AMC GREMLIN
MASTER CYLINDER ASSY
BRAKE PEDAL ASSY
POWER BOOSTER ASSY



1976 AMC GREMLIN
FRONT BRAKE HYD. LINES &
HOSES & PRESSURE VALVE



1976 AMC GREMLIN
REAR BRAKE HYD. LINES & HOSE



1966 CHRYSLER VALIANT
FRONT DRUM BRAKE ASSY



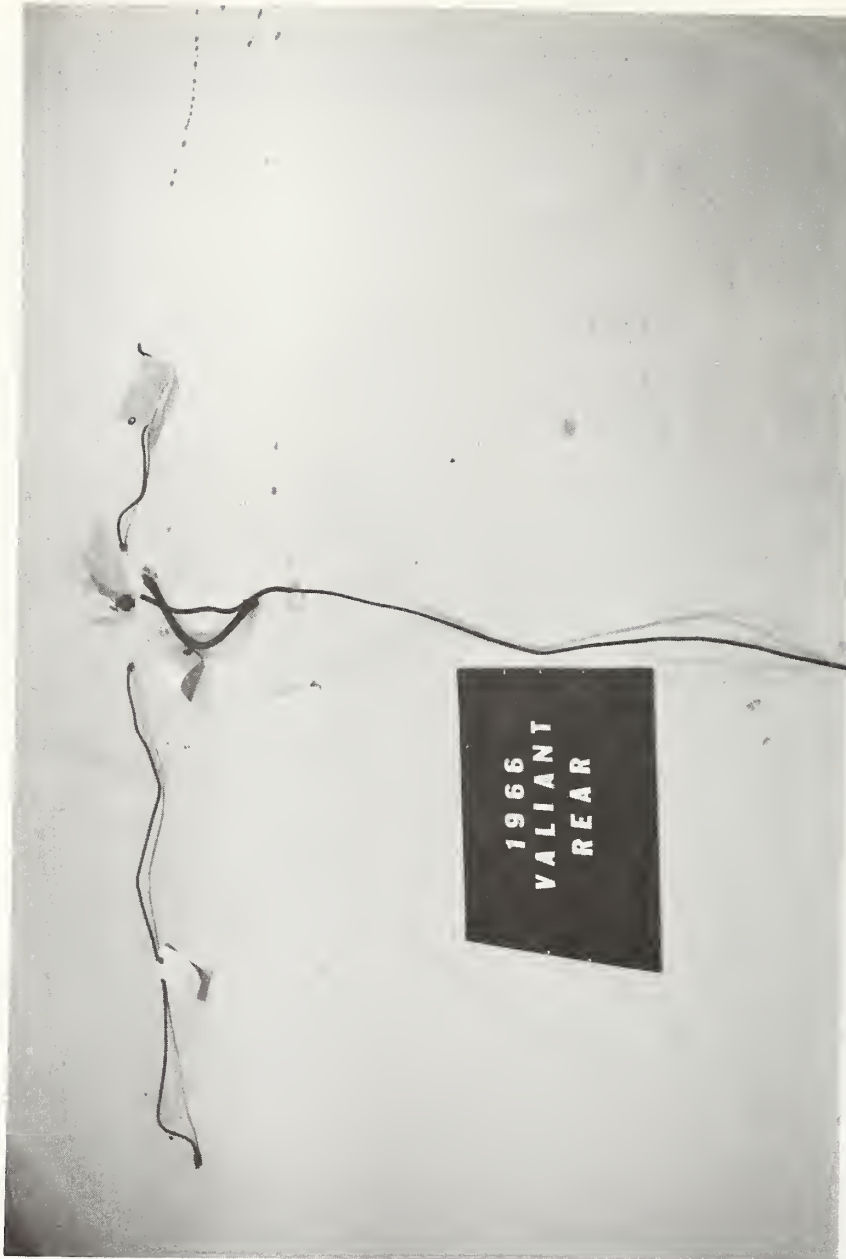
1966 CHRYSLER VALIANT
REAR DRUM BRAKE ASSY



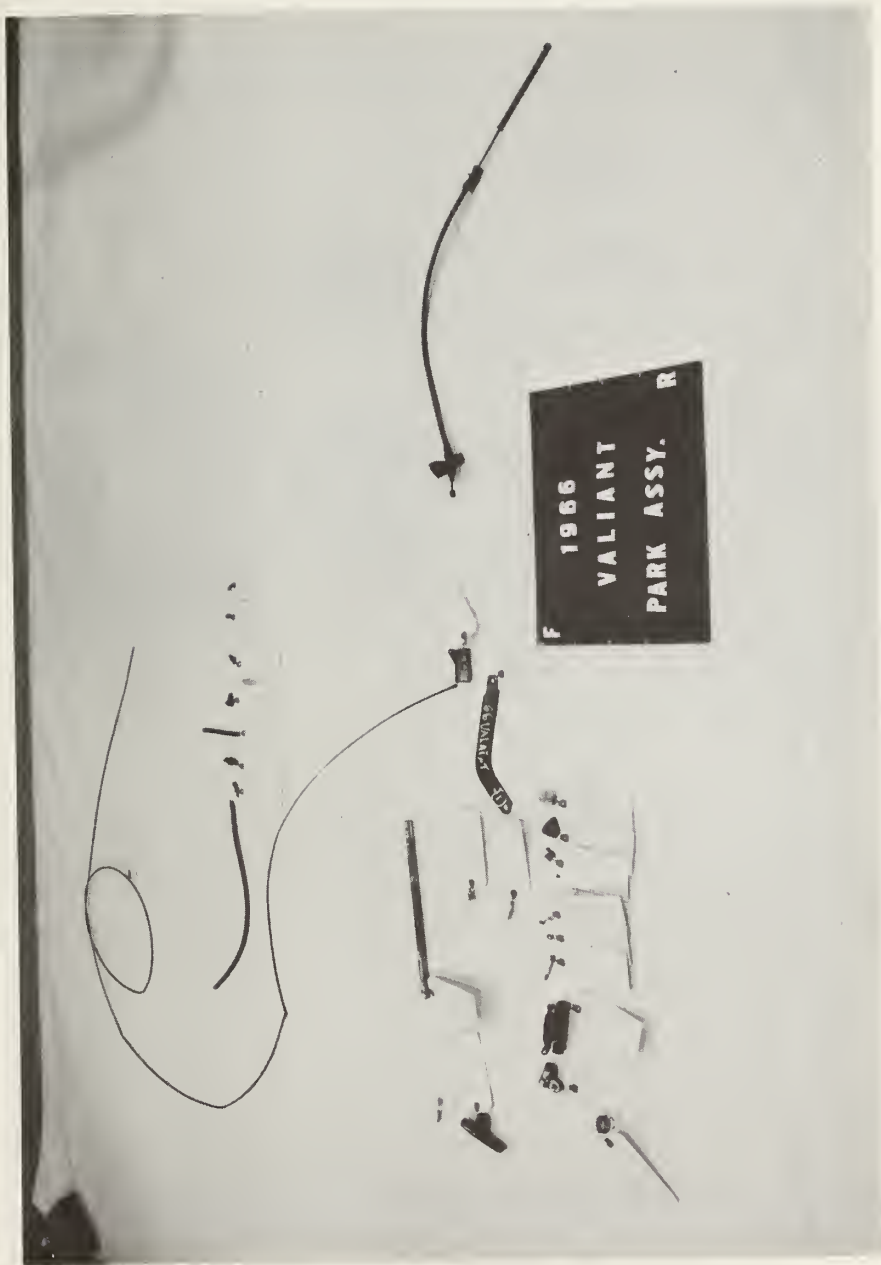
1966 CHRYSLER VALIANT
MASTER CYLINDER ASSY
BRAKE PEDAL ASSY
POWER BOOSTER ASSY



1966 CHRYSLER VALLANT
FRONT BRAKE HYD. LINES & HOSES



1966 CHRYSLER VALIANT
REAR BRAKE HYD. LINES & HOSE



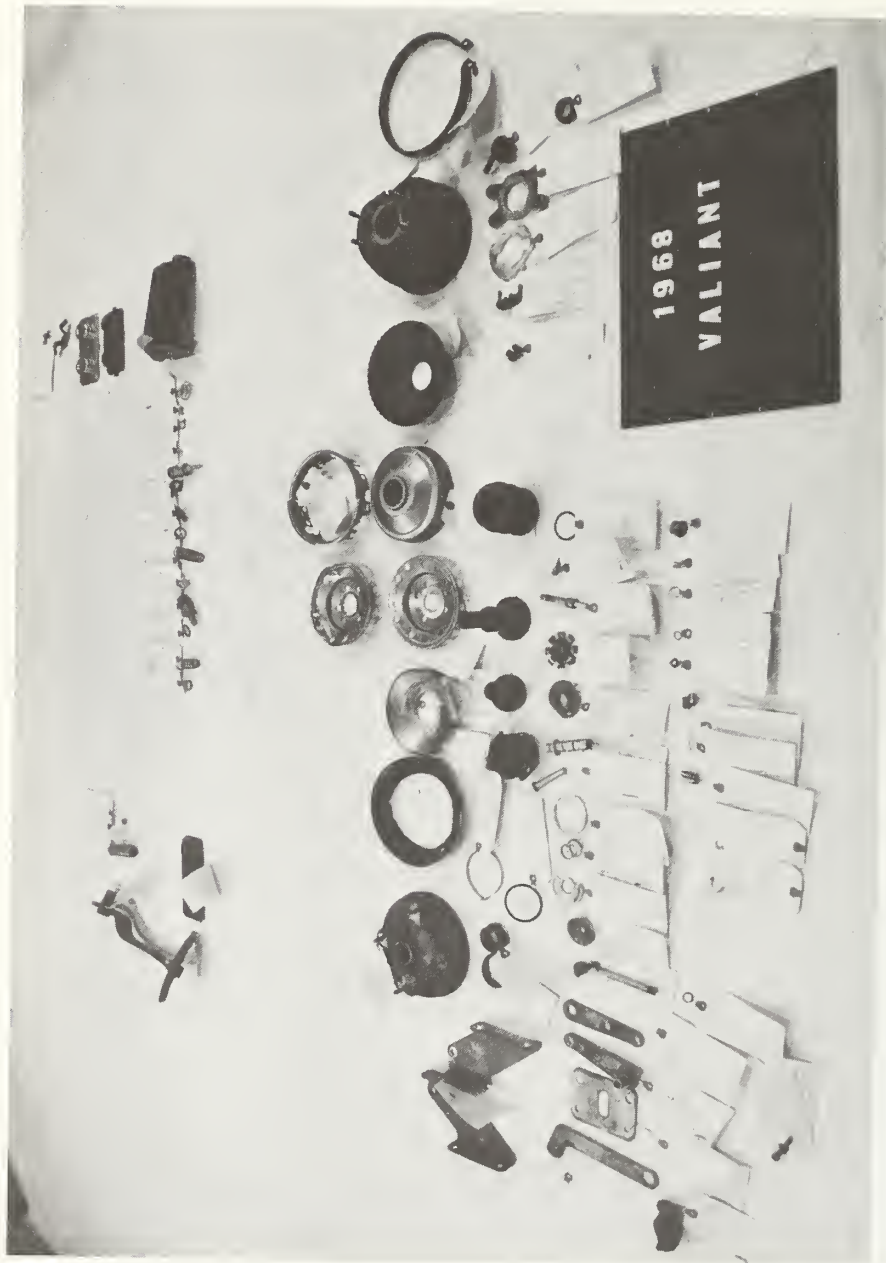
1966 CHRYSLER VALIANT
PARK BRAKE ASSY & CABLES



1968 CHRYSLER VALIANT
FRONT DRUM BRAKE ASSY



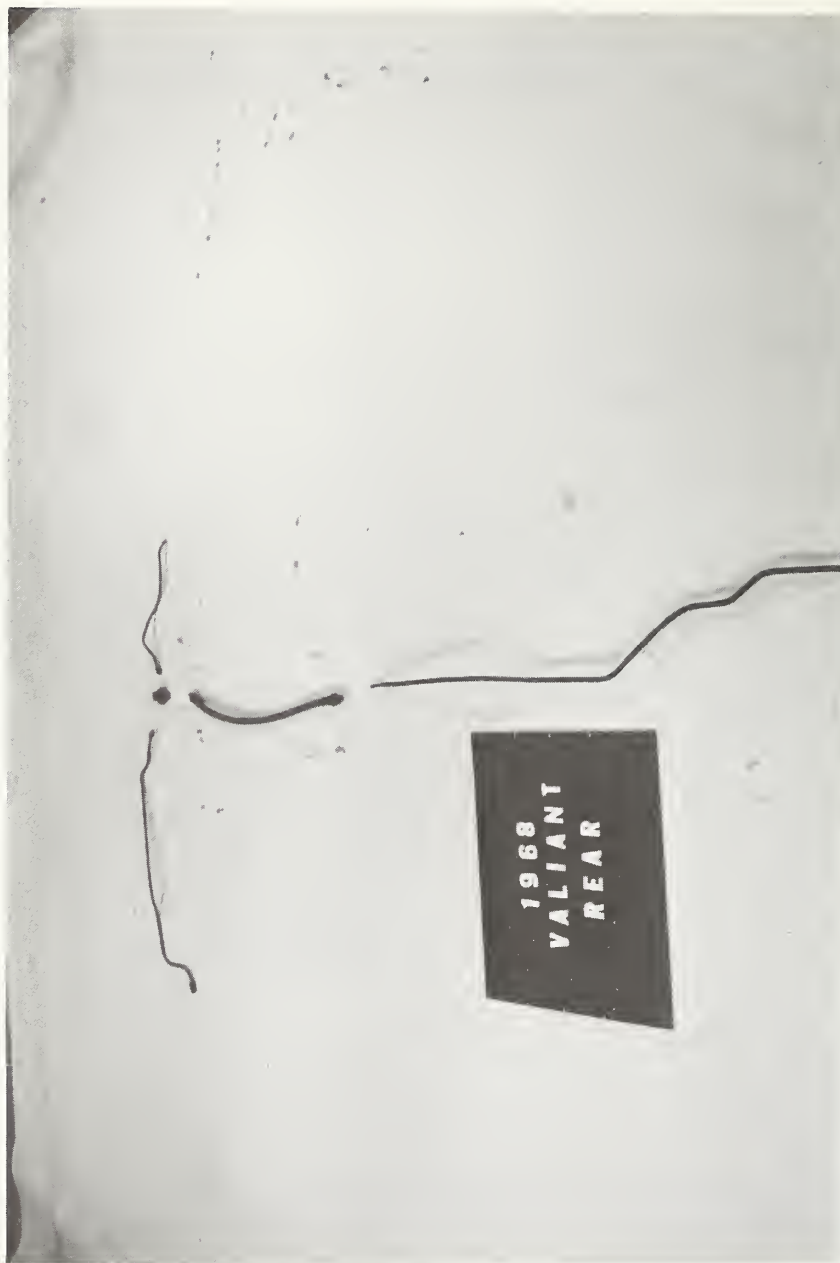
1968 CHRYSLER VALIANT
REAR DRUM BRAKE ASSY



1968 CHRYSLER VALIANT
MASTER CYLINDER ASSY
BRAKE PEDAL ASSY
POWER BOOSTER ASSY



1968 CHRYSLER VALIANT
FRONT BRAKE HYD. LINES &
HOSES & PRESSURE VALVE



1968 CHRYSLER VALIANT
REAR BRAKE HYD. LINES & HOSE



1968 CHRYSLER VALIANT
PARK BRAKE ASSY & CABLES



1976 CHRYSLER VALIANT
FRONT DISC BRAKE ASSY



1976 CHRYSLER VALIANT
REAR DRUM BRAKE ASSY



1976 CHRYSLER VALIANT
 MASTER CYLINDER ASSY
 BRAKE PEDAL ASSY
 POWER BOOSTER ASSY



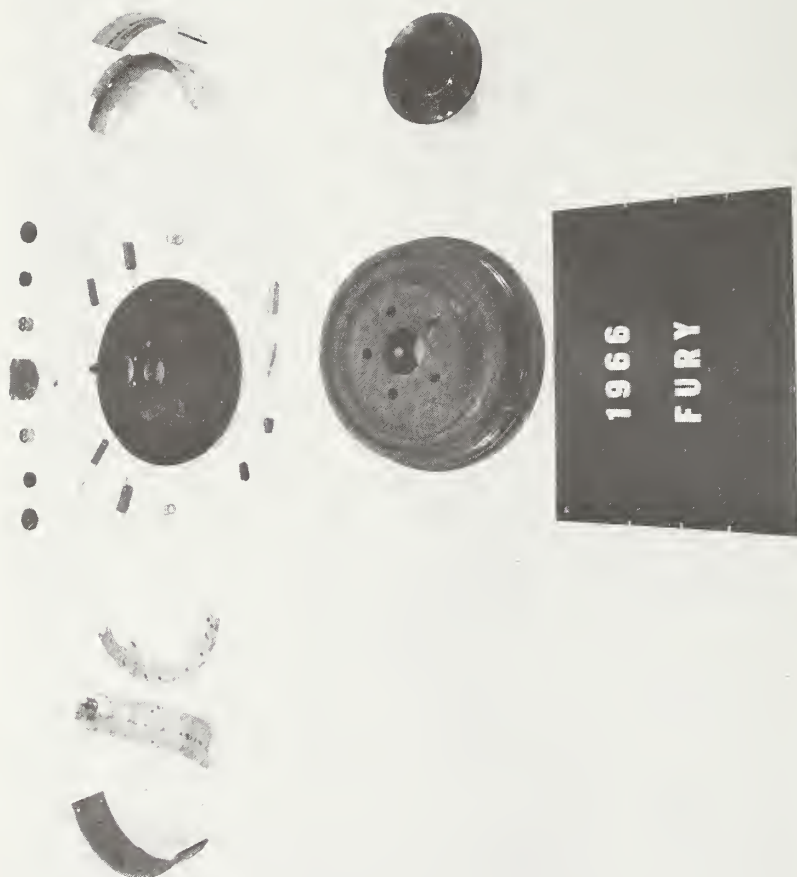
1976 CHRYSLER VALIANT
FRONT BRAKE HYD. LINES &
HOSES & PRESSURE VALVE



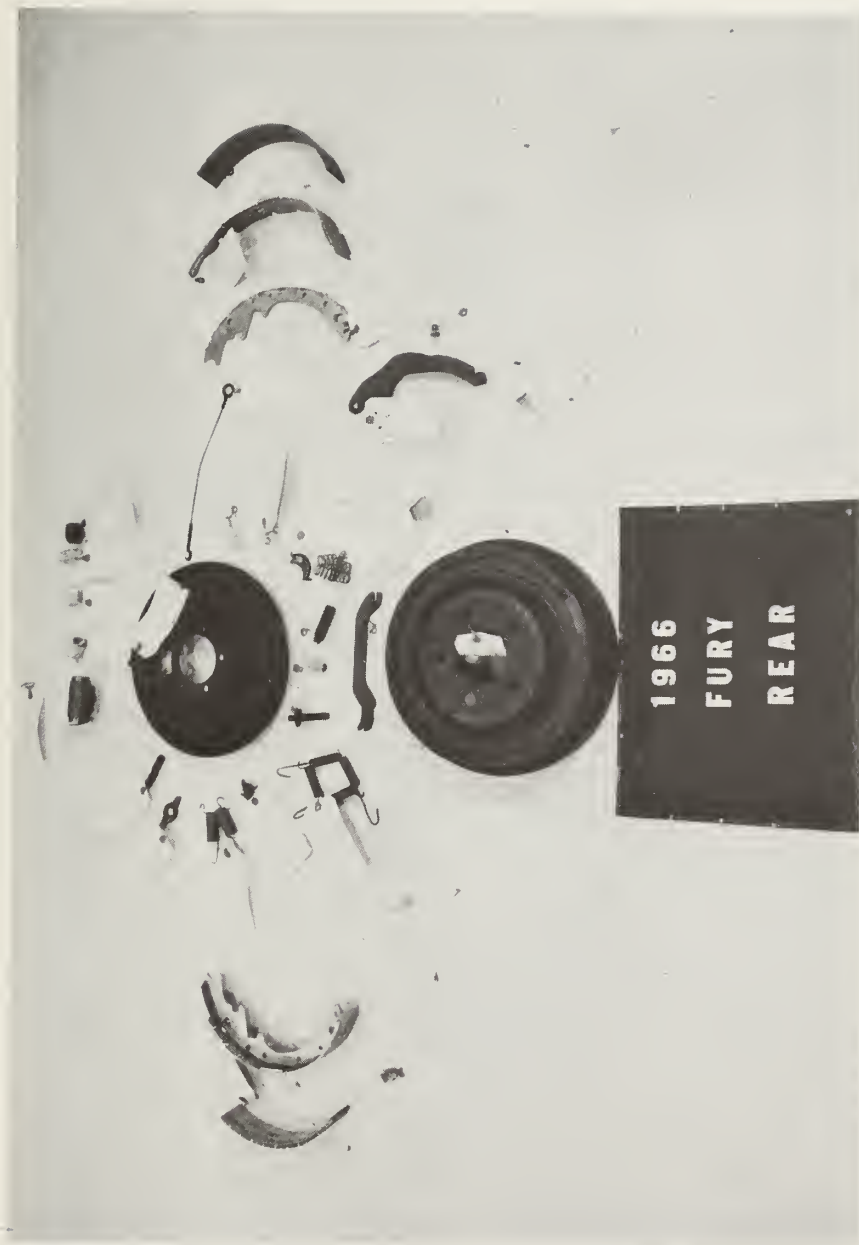
1976 CHRYSLER VALIANT
REAR BRAKE HYD. LINES & HOSE



1976 CHRYSLER VALIANT
 PARK BRAKE ASSY & CABLES



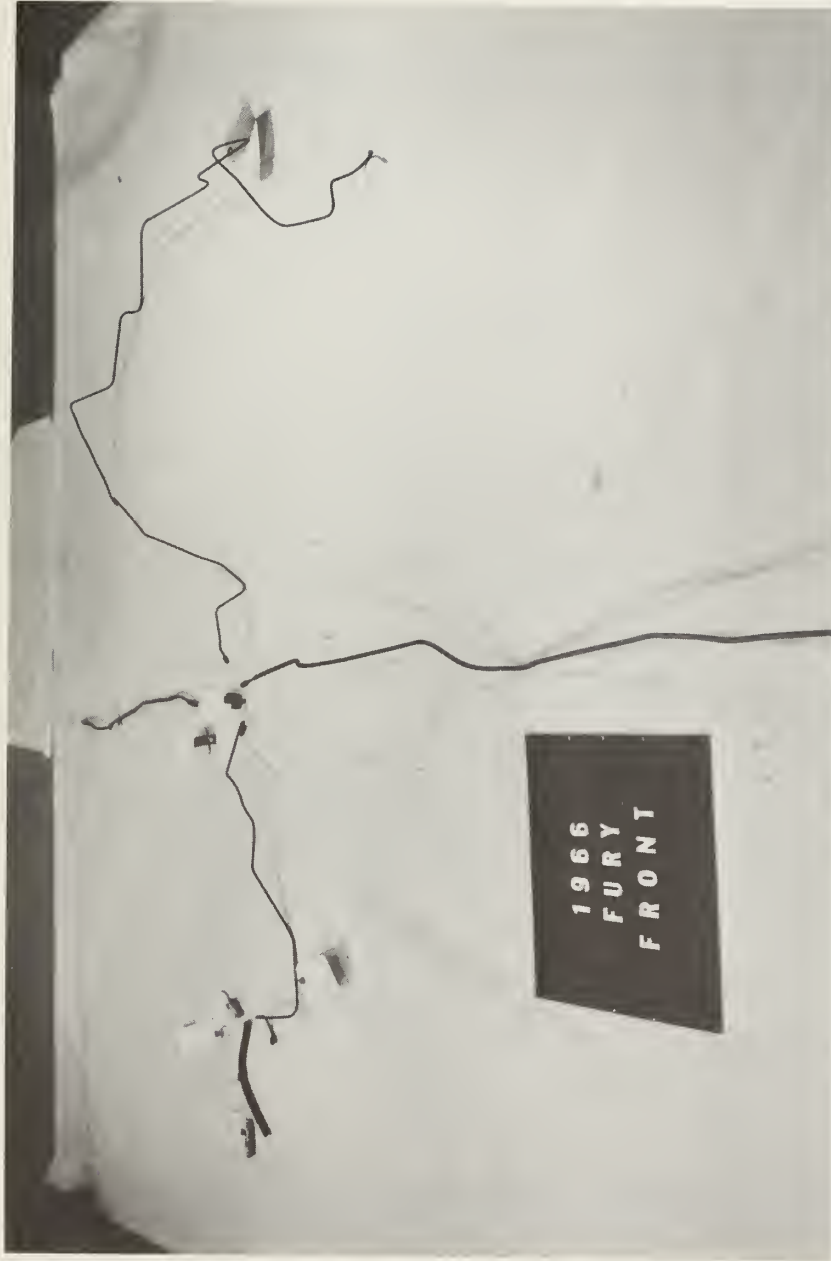
1966 CHRYSLER FURY
FRONT BRAKE ASSY



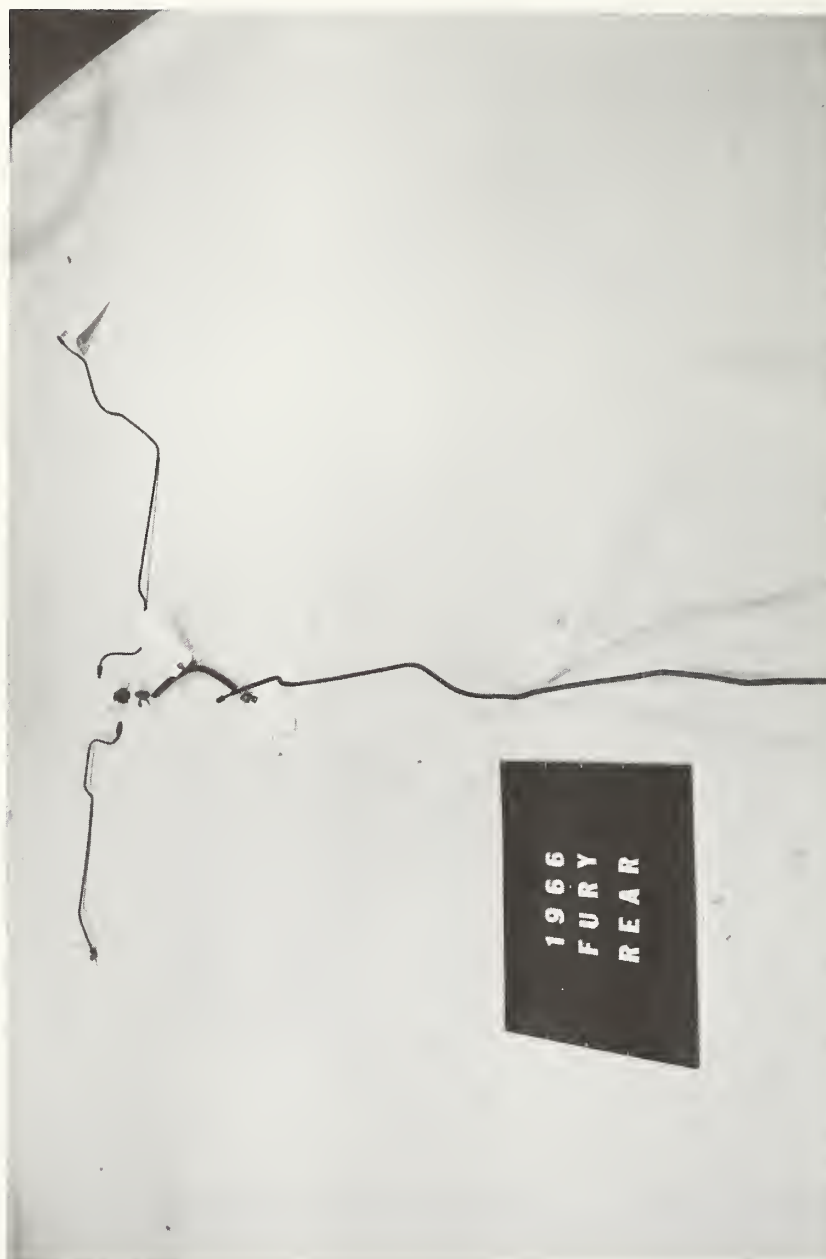
1966 CHRYSLER FURY
REAR DRUM BRAKE ASSY



1966 CHRYSLER FURY
MASTER CYLINDER ASSY
BRAKE PEDAL ASSY
POWER BOOSTER ASSY



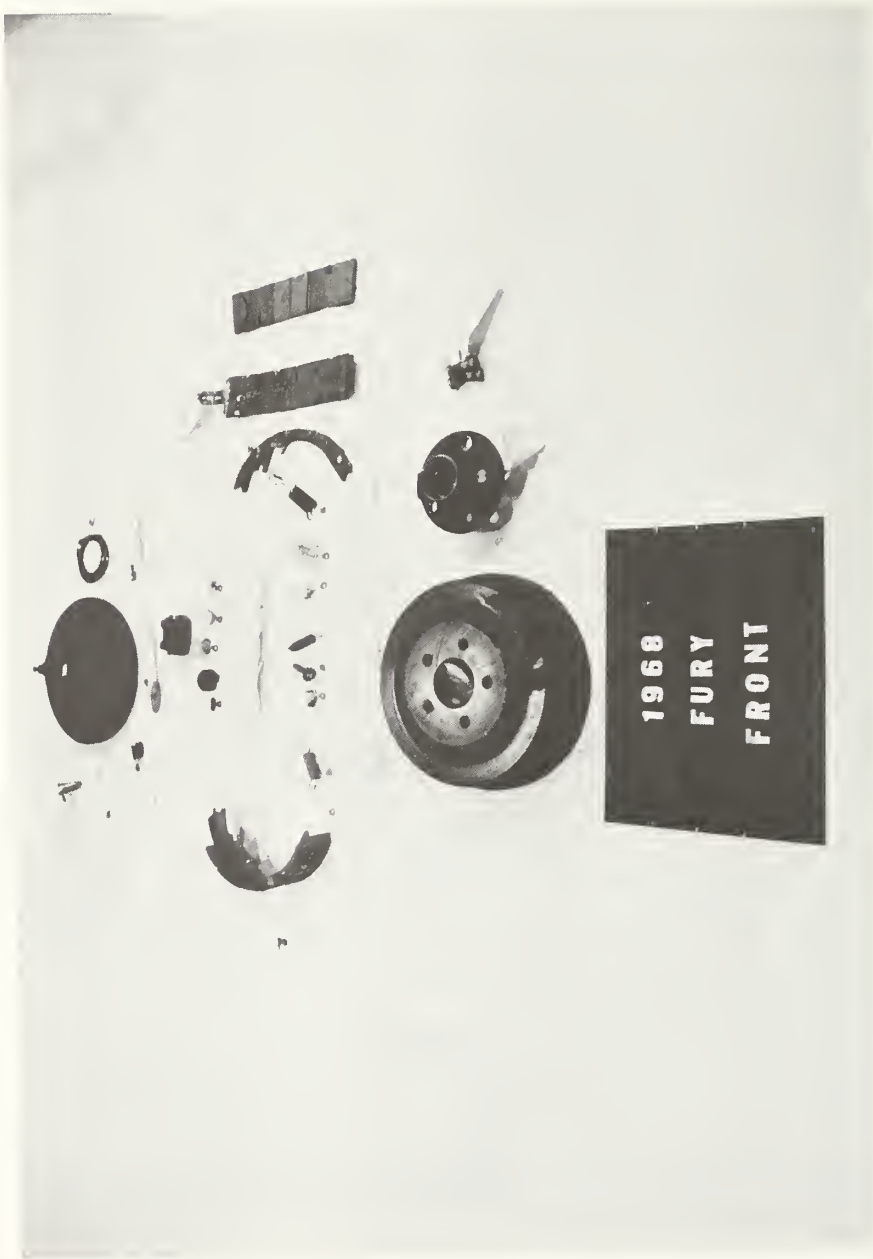
1966 CHRYSLER FURY
FRONT BRAKE HYD. LINES & HOSES



1966 CHRYSLER FURY
REAR BRAKE HYD. LINES & HOSE



1966 CHRYSLER FURY
PARK BRAKE ASSY & CABLES



1968 CHRYSLER FURY
FRONT DRUM BRAKE ASSY



1968 CHRYSLER FURY
REAR DRUM BRAKE ASSY



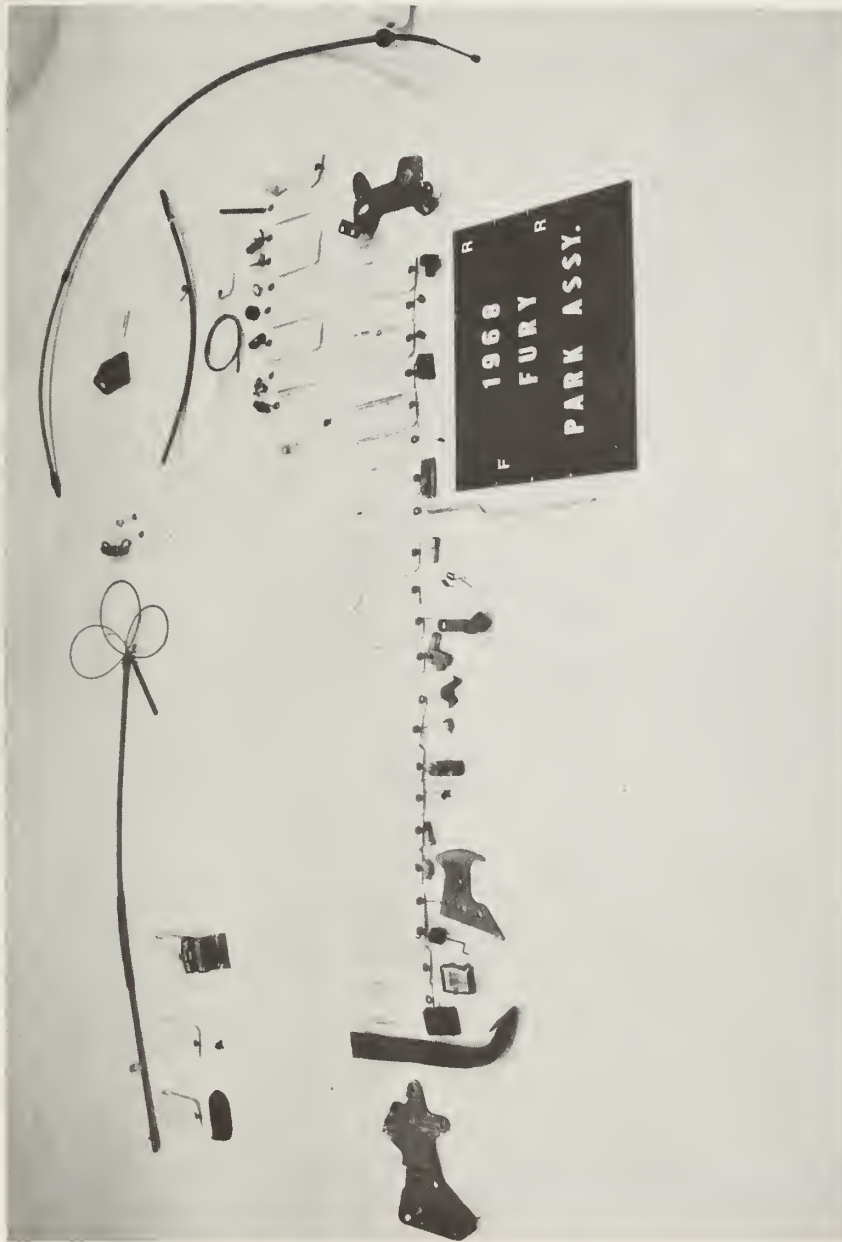
1968 CHRYSLER FURY
MASTER CYLINDER ASSY
BRAKE PEDAL ASSY
POWER BOOSTER ASSY



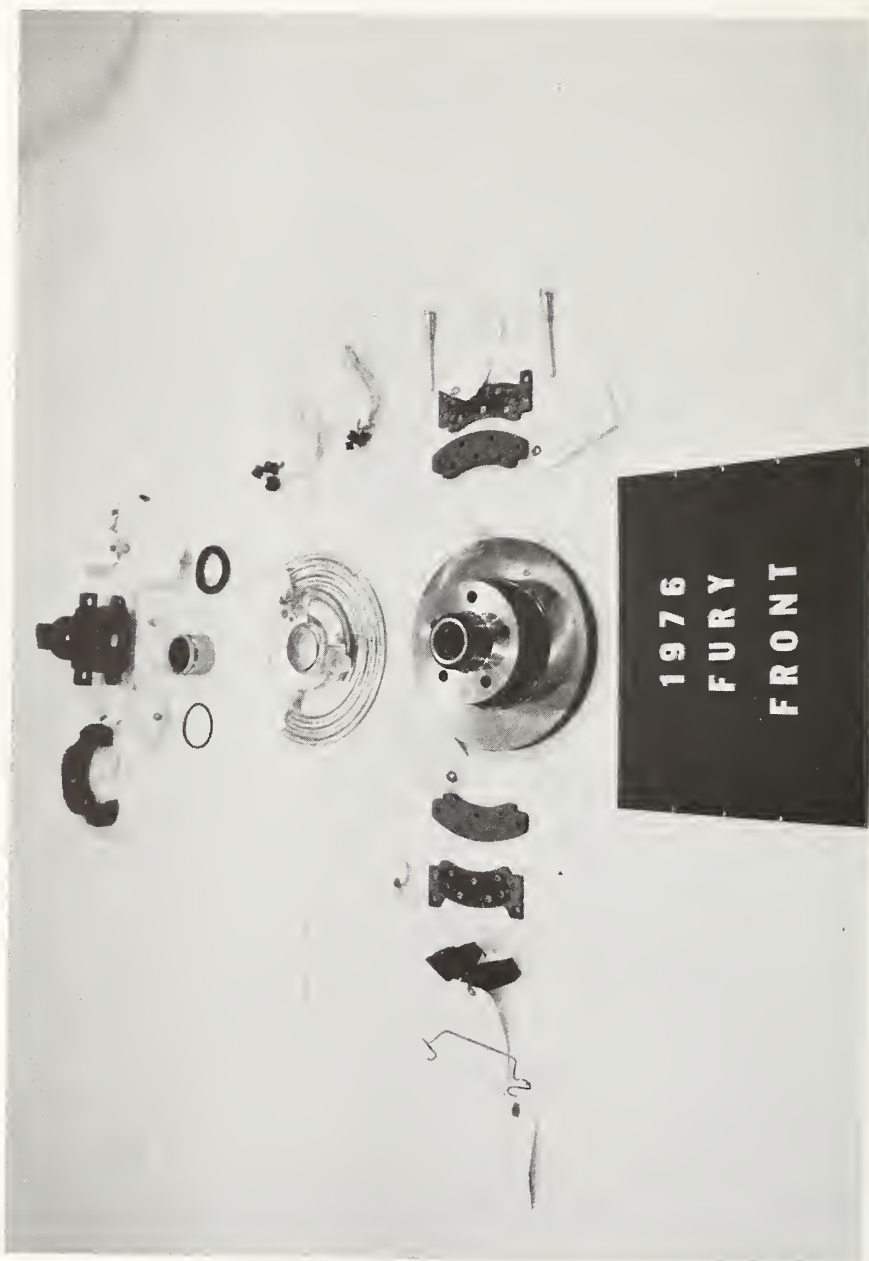
1968 CHRYSLER FURY
FRONT BRAKE HYD. LINES &
HOSES & PRESSURE VALVE



1968 CHRYSLER FURY
REAR BRAKE HYD. LINES & HOSE



1968 CHRYSLER FURY
PARK BRAKE ASSY & CABLES

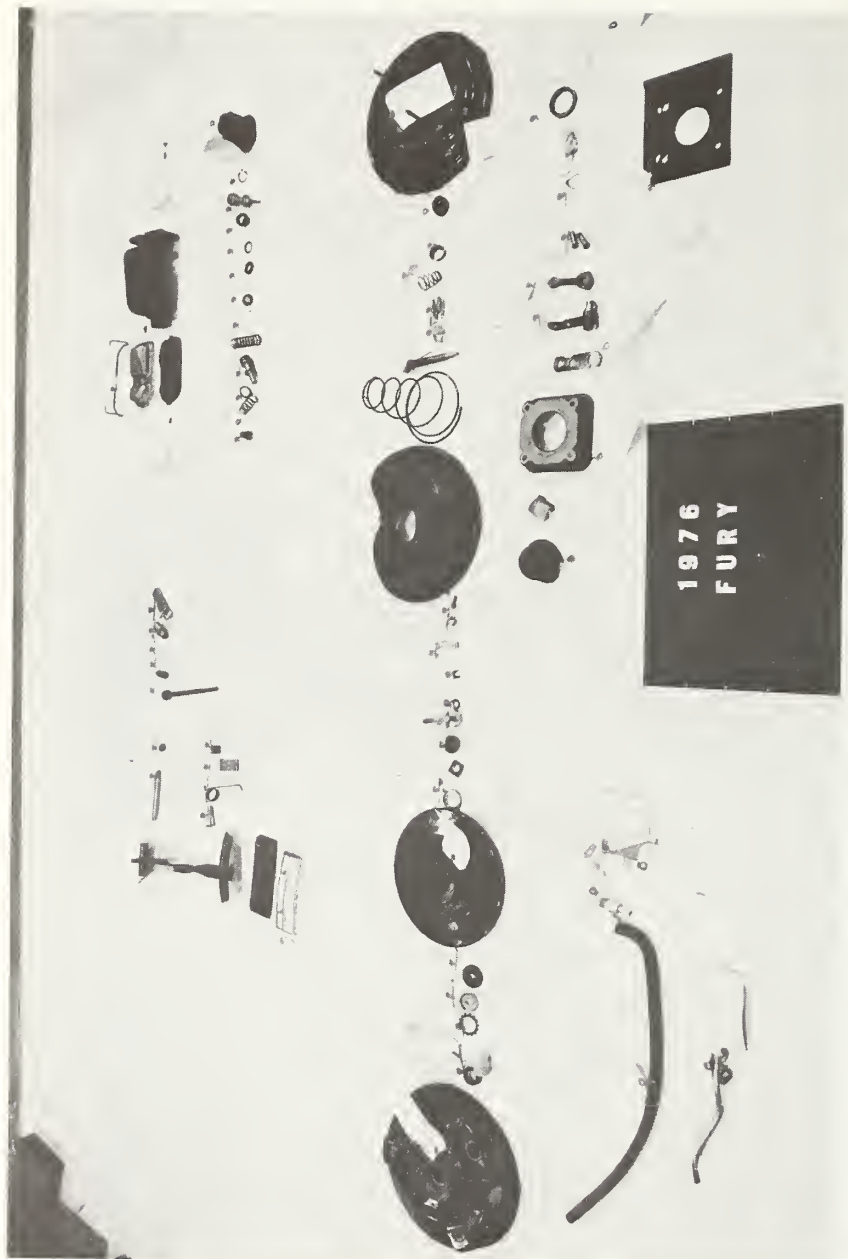


1976 CHRYSLER FURY
FRONT DISC BRAKE ASSY



1976
FURY
REAR

1976 CHRYSLER FURY
REAR BRAKE ASSY



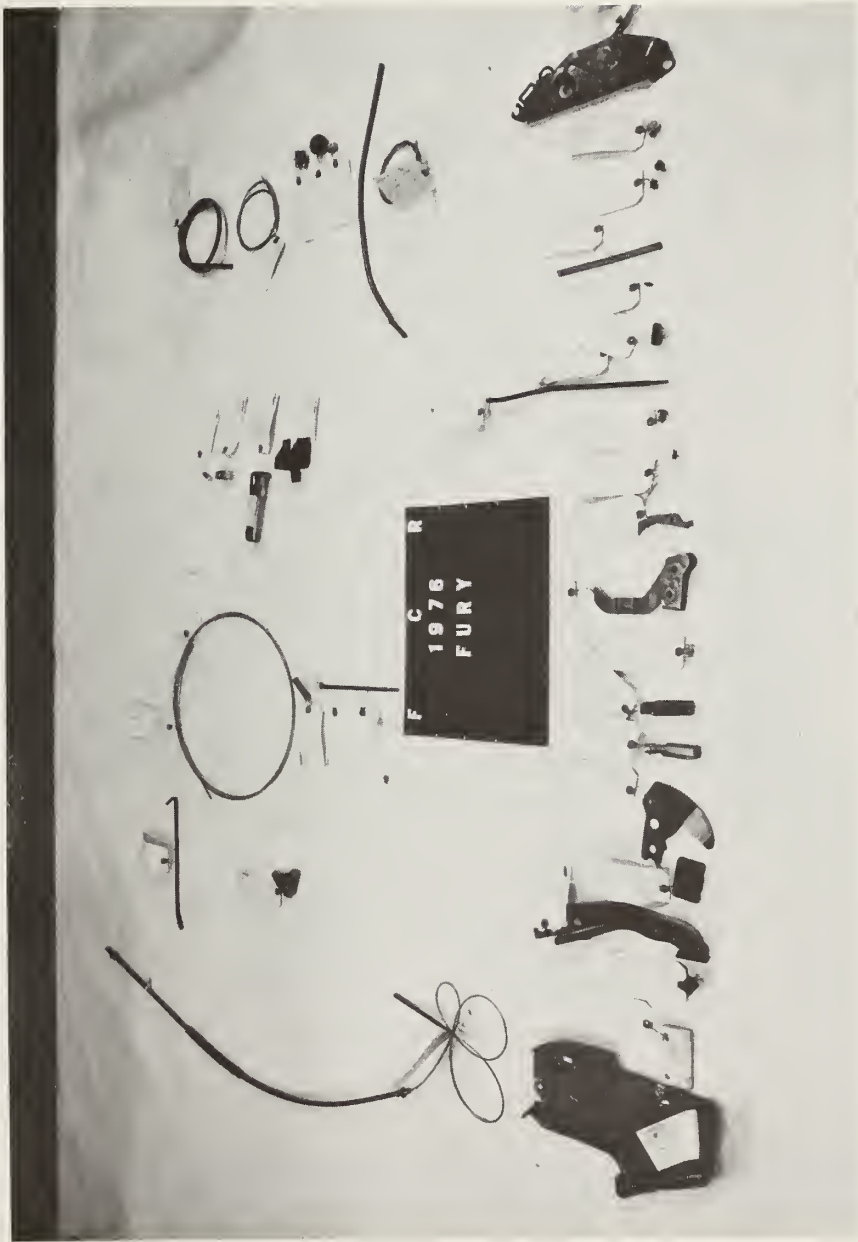
1976 CHRYSLER FURY
 MASTER CYLINDER ASSY
 BRAKE PEDAL ASSY
 POWER BOOSTER ASSY



1976 CHRYSLER FURY
FRONT BRAKE HYD. LINES &
HOSES & PRESSURE VALVE



1976 CHRYSLER FURY
REAR BRAKE HYD. LINES & HOSE



1976 CHRYSLER FURY
PARK BRAKE ASSY & CABLES



1966 FORD FALCON
FRONT DRUM BRAKE ASSY



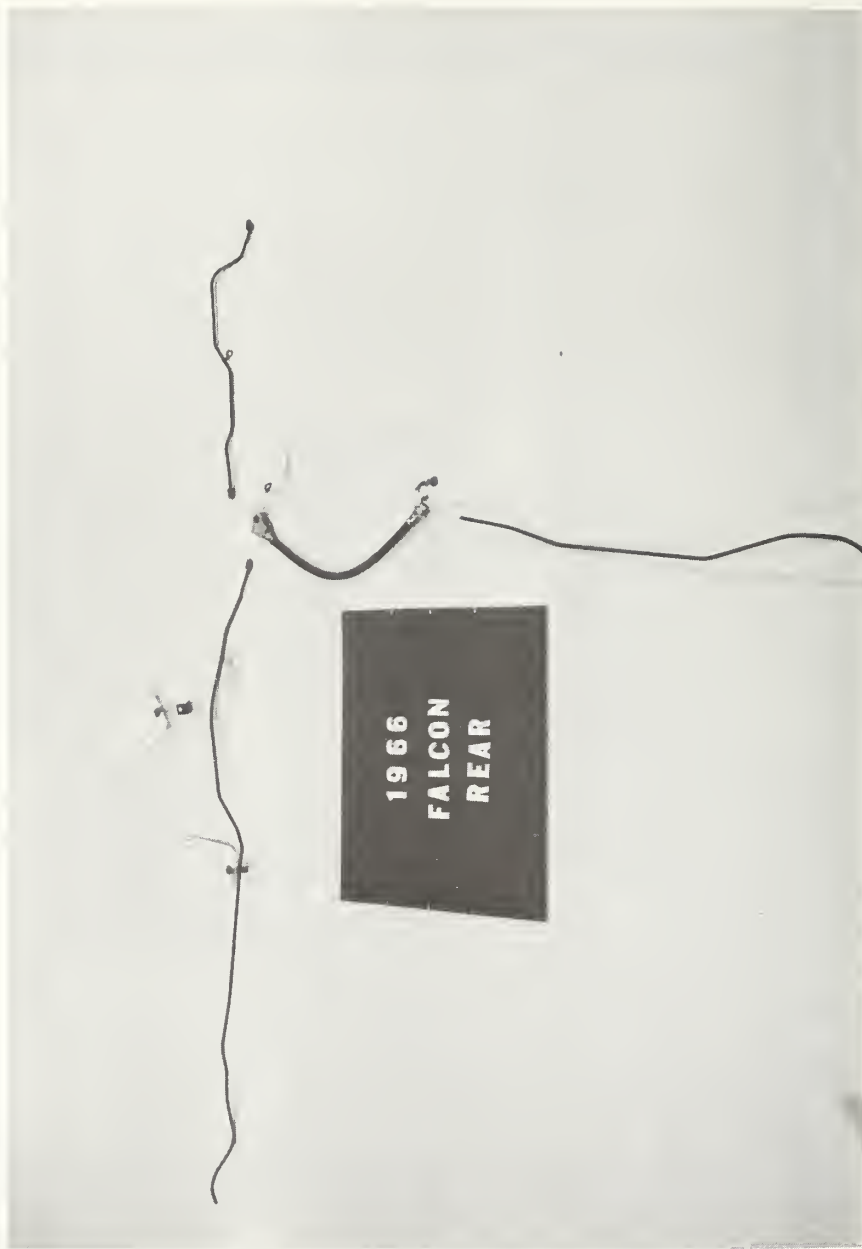
1966 FORD FALCON
REAR DRUM BRAKE ASSY



1966 FORD FALCON
MASTER CYLINDER ASSY
BRAKE PEDAL ASSY



1966 FORD FALCON
FRONT BRAKE HYD. LINES & HOSES



1966 FORD FALCON
REAR BRAKE HYD. LINES & HOSE



1966 FORD FALCON
PARK BRAKE ASSY & CABLES



1968 FORD FALCON
FRONT DISC BRAKE ASSY



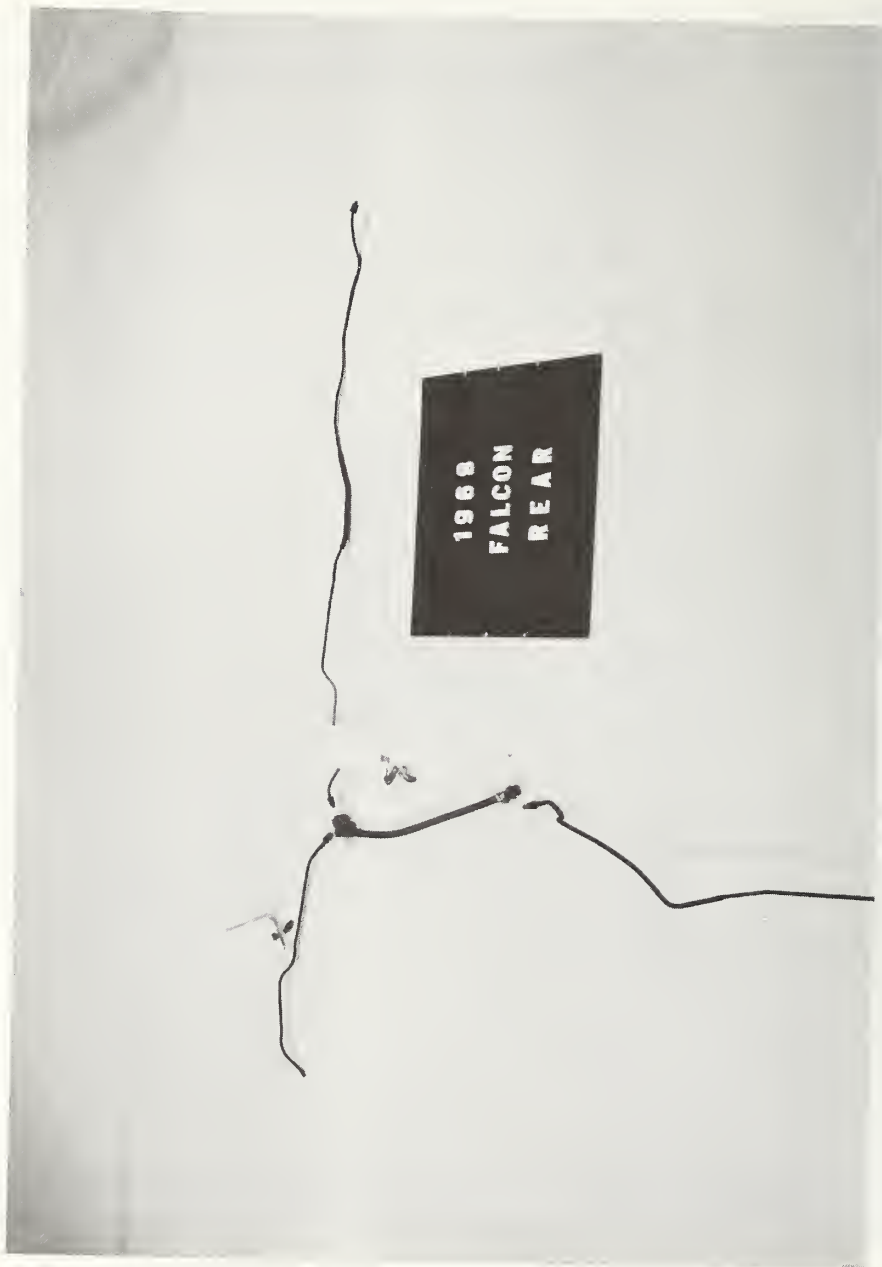
1968 FORD FALCON
REAR DRUM BRAKE ASSY



1968 FORD FALCON
MASTER CYLINDER ASSY
BRAKE PEDAL ASSY
POWER BOOSTER ASSY



1968 FORD FALCON
FRONT BRAKE HYD. LINES &
HOSES & PRESSURE VALVE



1968 FORD FALCON
REAR BRAKE HYD. LINES & HOSE



1968 FORD FALCON
PARK BRAKE ASSY & CABLES



1976
MAVERICK
FRONT

1976 FORD MAVERICK
FRONT DISC BRAKE ASSY

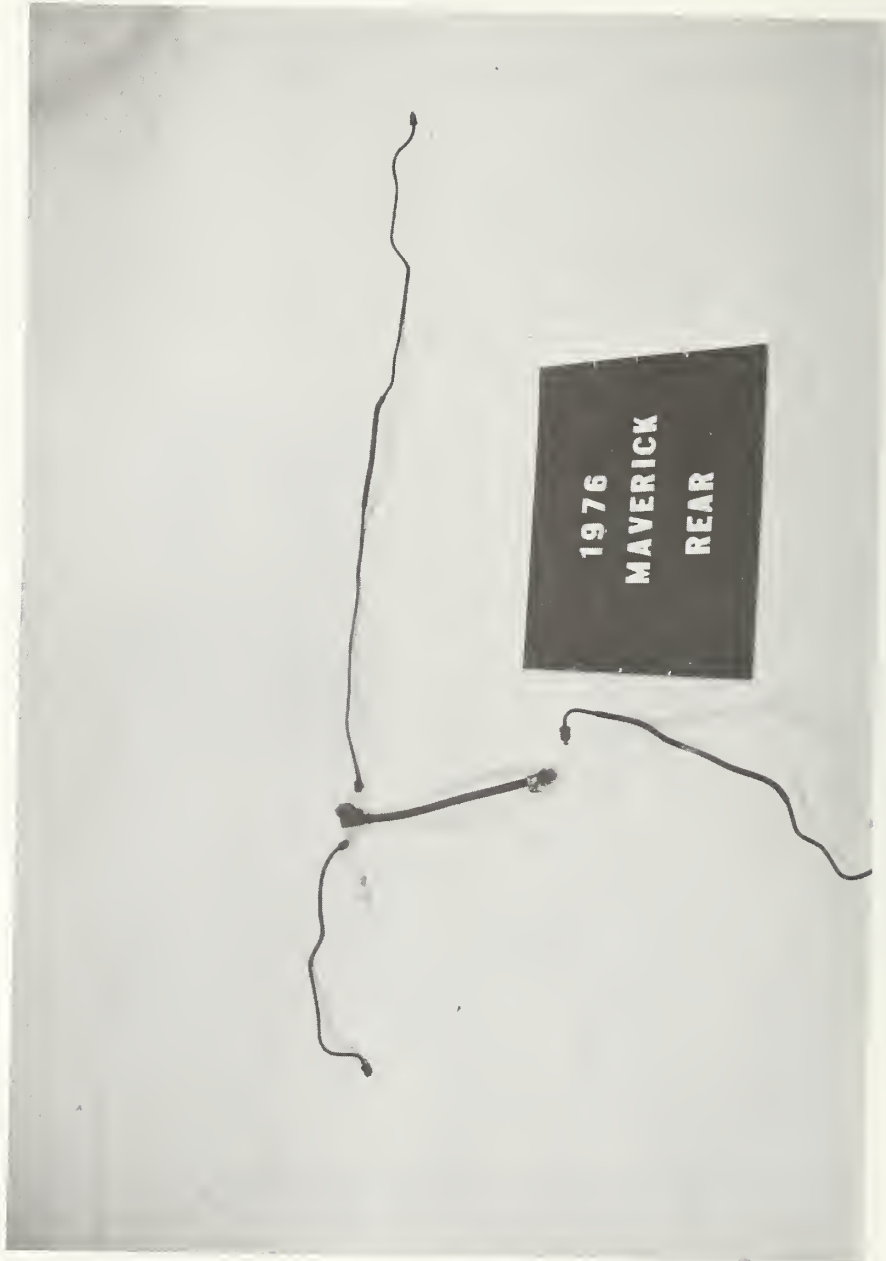




1976 FORD MAVERICK
MASTER CYLINDER ASSY
BRAKE PEDAL ASSY
POWER BOOSTER ASSY



1976 FORD MAVERICK
FRONT BRAKE HYD. LINES &
HOSES & PRESSURE VALVE



1976 FORD MAVERICK
REAR BRAKE HYD. LINES & HOSE



1976 FORD MAVERICK
PARK BRAKE ASSY & CABLES



1966 FORD LINCOLN CONTINENTAL
FRONT DISC BRAKE ASSY



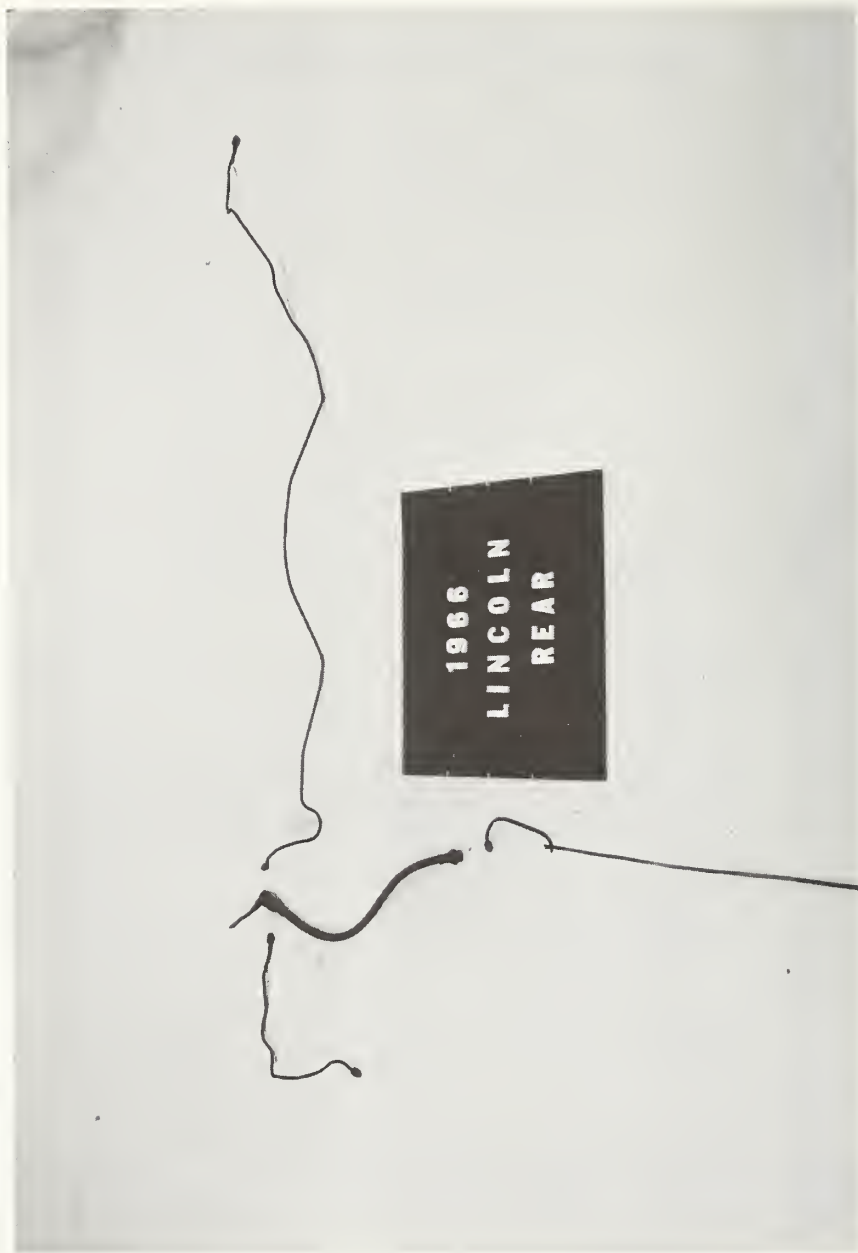
1966 FORD LINCOLN CONTINENTAL
REAR DRUM BRAKE ASSY



1966 FORD LINCOLN CONTINENTAL
 MASTER CYLINDER ASSY
 BRAKE PEDAL ASSY
 POWER BOOSTER ASSY



1966 FORD LINCOLN CONTINENTAL,
FRONT BRAKE HYD. LINES & VALVES
& PRESSURE VALVES



1966 FORD LINCOLN CONTINENTAL
REAR BRAKE HYD. LINES & HOSE



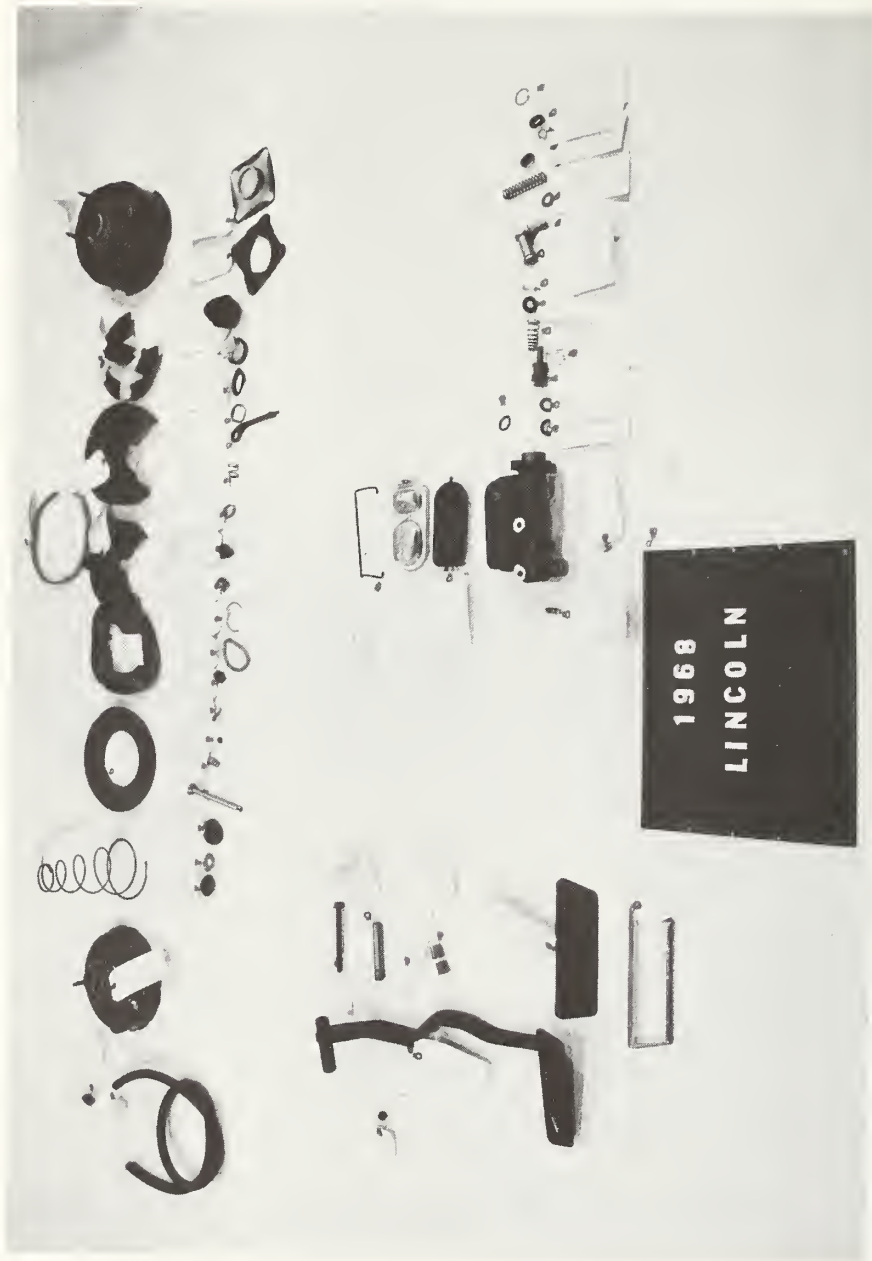
1966 FORD LINCOLN CONTINENTAL
PARK BRAKE ASSY & CABLES



1968 FORD LINCOLN CONTINENTAL
FRONT DISC BRAKE ASSY



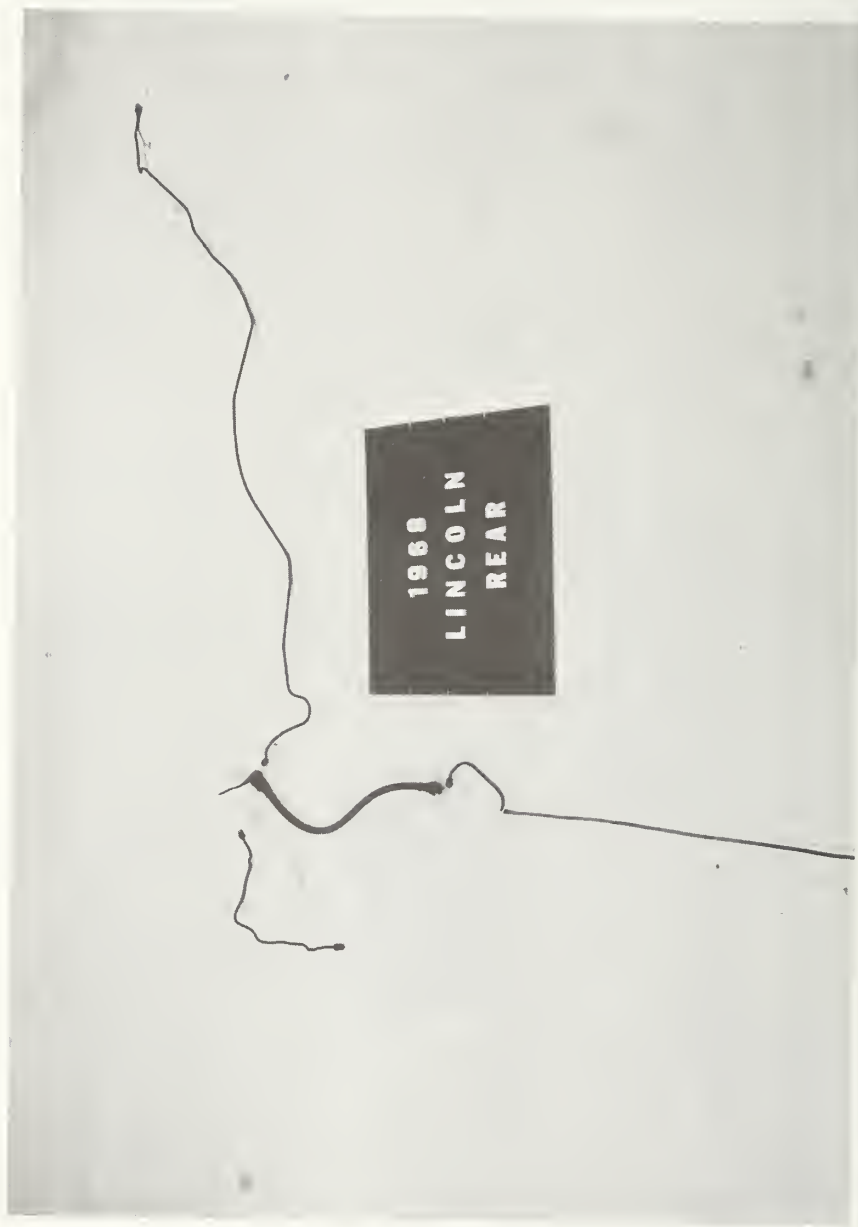
1968 FORD LINCOLN CONTINENTAL
REAR DRUM BRAKE ASSY



1968 FORD LINCOLN CONTINENTAL
 MASTER CYLINDER ASSY
 BRAKE PEDAL ASSY
 POWER BOOSTER ASSY



1968 FORD LINCOLN CONTINENTAL,
FRONT BRAKE HYD. LINES &
HOSES & PRESSURE VALVES



1968 FORD LINCOLN CONTINENTAL
REAR BRAKE HYD. LINES & HOSE



1968 FORD LINCOLN CONTINENTAL
PARK BRAKE ASSY & CABLES



1976 FORD LINCOLN CONTINENTAL
FRONT DISC BRAKE ASSY



1976 FORD LINCOLN CONTINENTAL
REAR DISC BRAKE ASSY



1976 FORD LINCOLN CONTINENTAL,
MASTER CYLINDER ASSY
BRAKE PEDAL ASSY
HYD. POWER BOOSTER



1976 FORD LINCOLN CONTINENTAL
FRONT BRAKE HYD. LINES &
HOSES & PRESSURE VALVE



1976 FORD LINCOLN CONTINENTAL
REAR BRAKE HYD. LINES & HOSE



1976 FORD LINCOLN CONTINENTAL
PARK BRAKE ASSY & CABLES



1966
GALAXIE
FRONT

1966 FORD GALAXIE
FRONT DRUM BRAKE ASSY



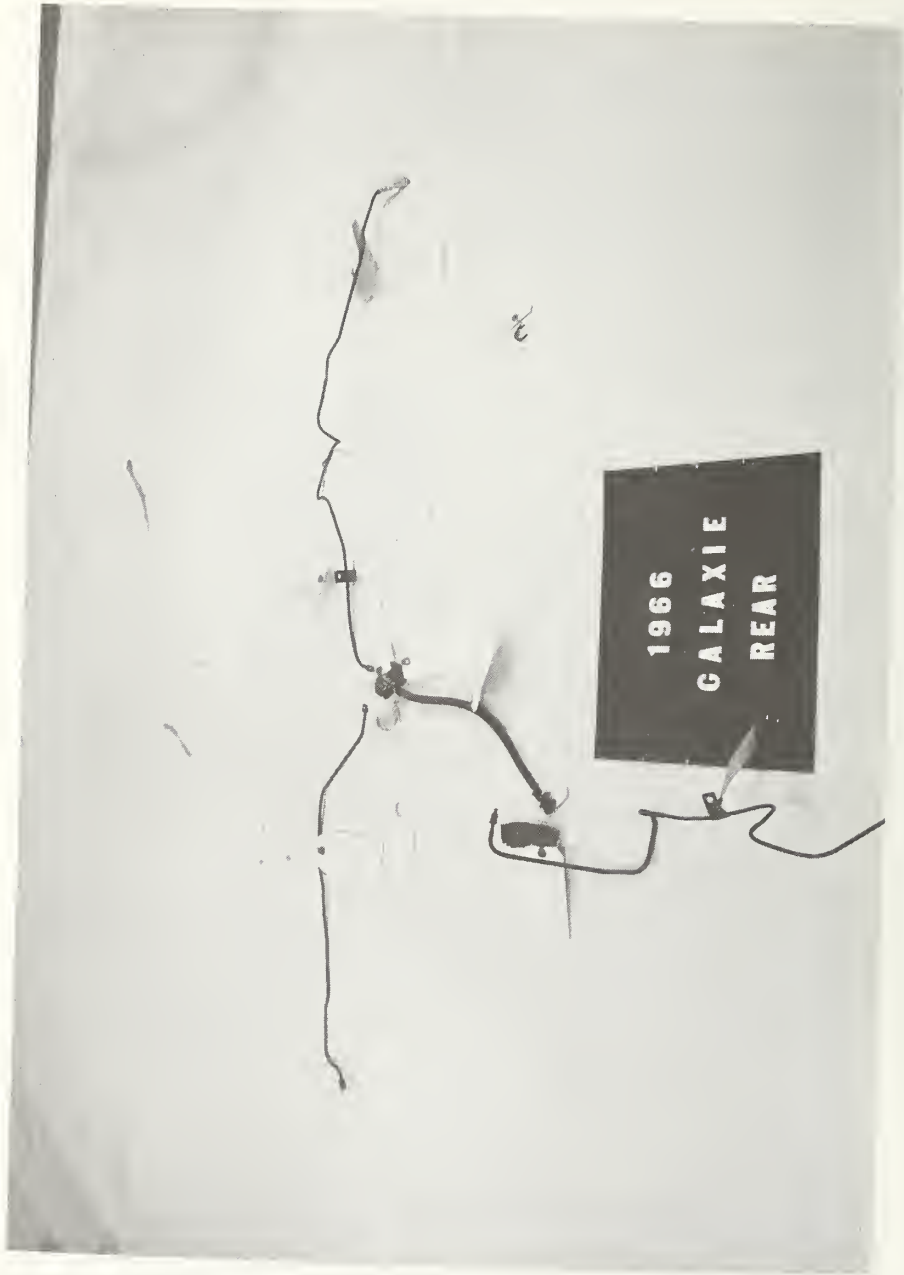
1966 FORD GALAXIE
REAR DRUM BRAKE ASSY



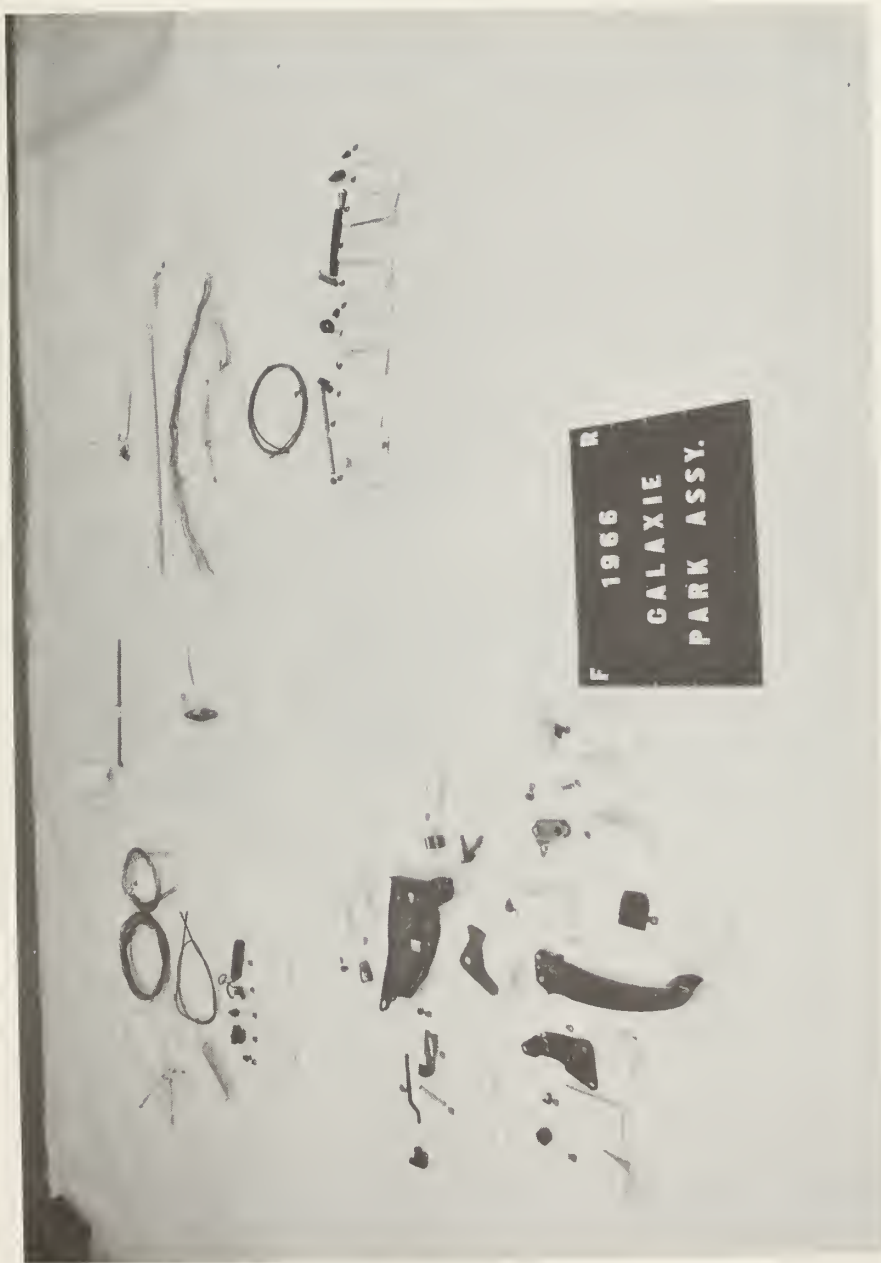
1966 FORD GALAXIE
MASTER CYLINDER ASSY
BRAKE PEDAL ASSY



1966 FORD GALAXIE
FRONT BRAKE HYD. LINES & HOSES



1966 FORD GALAXIE
REAR BRAKE HYD. LINES & HOSE



1966 FORD GALAXIE
PARK BRAKE ASSY & CABLES



1968 FORD GALAXIE
FRONT DISC BRAKE ASSY



1968 FORD GALAXIE
REAR DRUM BRAKE ASSY



1968 FORD GALAXIE
 MASTER CYLINDER ASSY
 BRAKE PEDAL ASSY
 POWER BOOSTER ASSY



1968 FORD GALAXIE
FRONT BRAKE HYD. LINES &
HOSES & PRESSURE VALVE



1968 FORD GALAXIE
REAR BRAKE HYD. LINES & HOSE



1968 FORD GALAXIE
PARK BRAKE ASSY & CABLES



1976 FORD GALAXIE
FRONT DISC BRAKE ASSY



1976 FORD GALAXIE
REAR DRUM BRAKE ASSY



1976 FORD GALAXIE
MASTER CYLINDER ASSY
BRAKE PEDAL ASSY
POWER BOOSTER ASSY



1976 FORD GALAXIE
FRONT BRAKE HYD. LINES &
HOSES & PRESSURE VALVE



1976 FORD GALAXIE
REAR BRAKE HYD. LINES & HOSE



1976 FORD GALAXIE
PARK BRAKE ASSY & CABLES



1966 GM CHEVROLET CHEVY II
FRONT DRUM BRAKE ASSY



1966 GM CHEVROLET CHEVY II
REAR DRUM BRAKE ASSY



1966 GM CHEVROLET CHEVY II
MASTER CYLINDER ASSY
BRAKE PEDAL ASSY



1966 GM CHEVROLET CHEVY II
FRONT BRAKE HYD. LINES & HOSES



1966 GM CHEVROLET CHEVY II
REAR BRAKE HYD. LINES & HOSE



1966 GM CHEVROLET CHEVY II
PARK BRAKE ASSY & CABLES



1968 GM CHEVROLET CHEVY II
FRONT DISC BRAKE ASSY



1968 GM CHEVROLET CHEVY II
REAR DRUM BRAKE ASSY



1968
CHEVY II

1968 GM CHEVROLET CHEVY II
MASTER CYLINDER ASSY
BRAKE PEDAL ASSY
POWER BOOSTER ASSY



1968 GM CHEVROLET CHEVY II
FRONT BRAKE HYD. LINES &
HOSES & PRESSURE VALVE



1968 GM CHEVROLET CHEVY II
REAR BRAKE LINES & HOSE



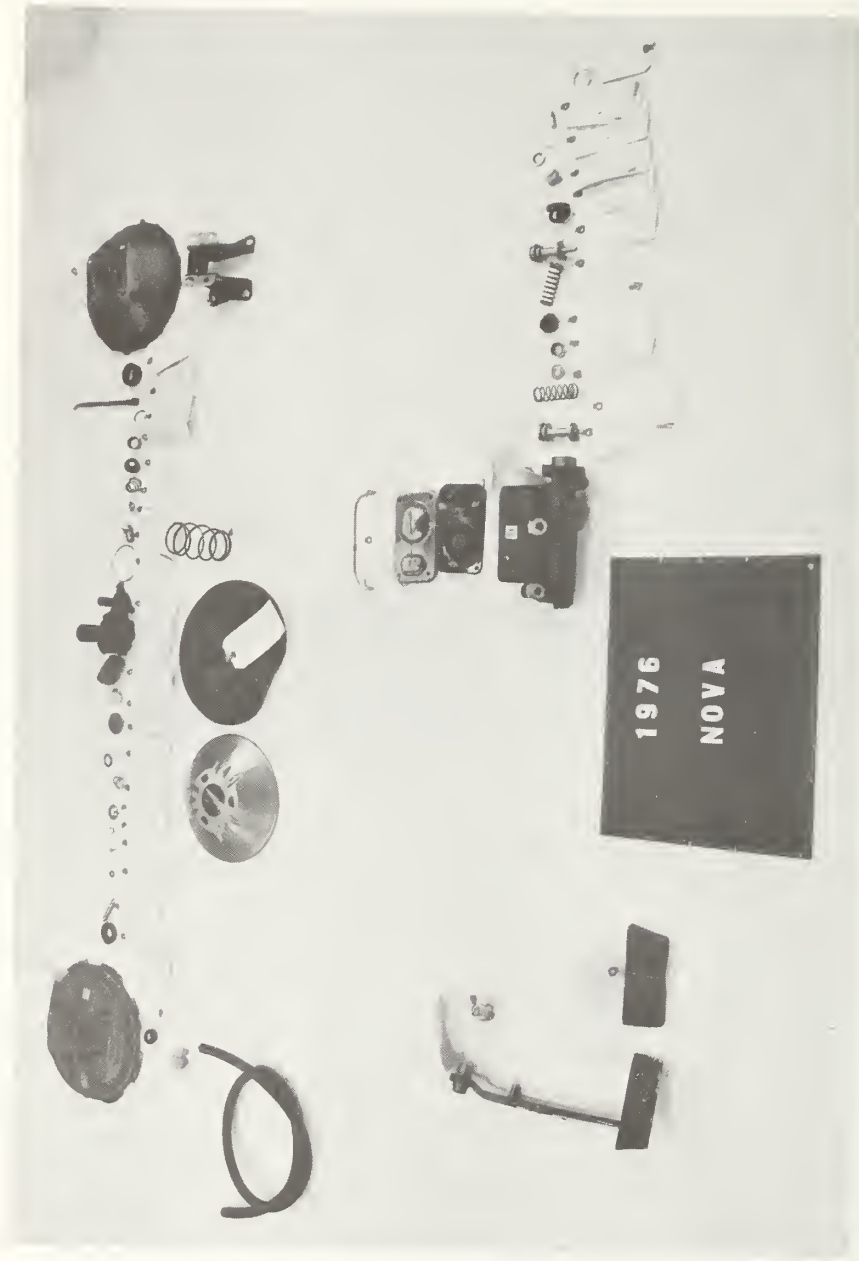
1968 GM CHEVROLET CHEVY II
PARK BRAKE ASSY & CABLES



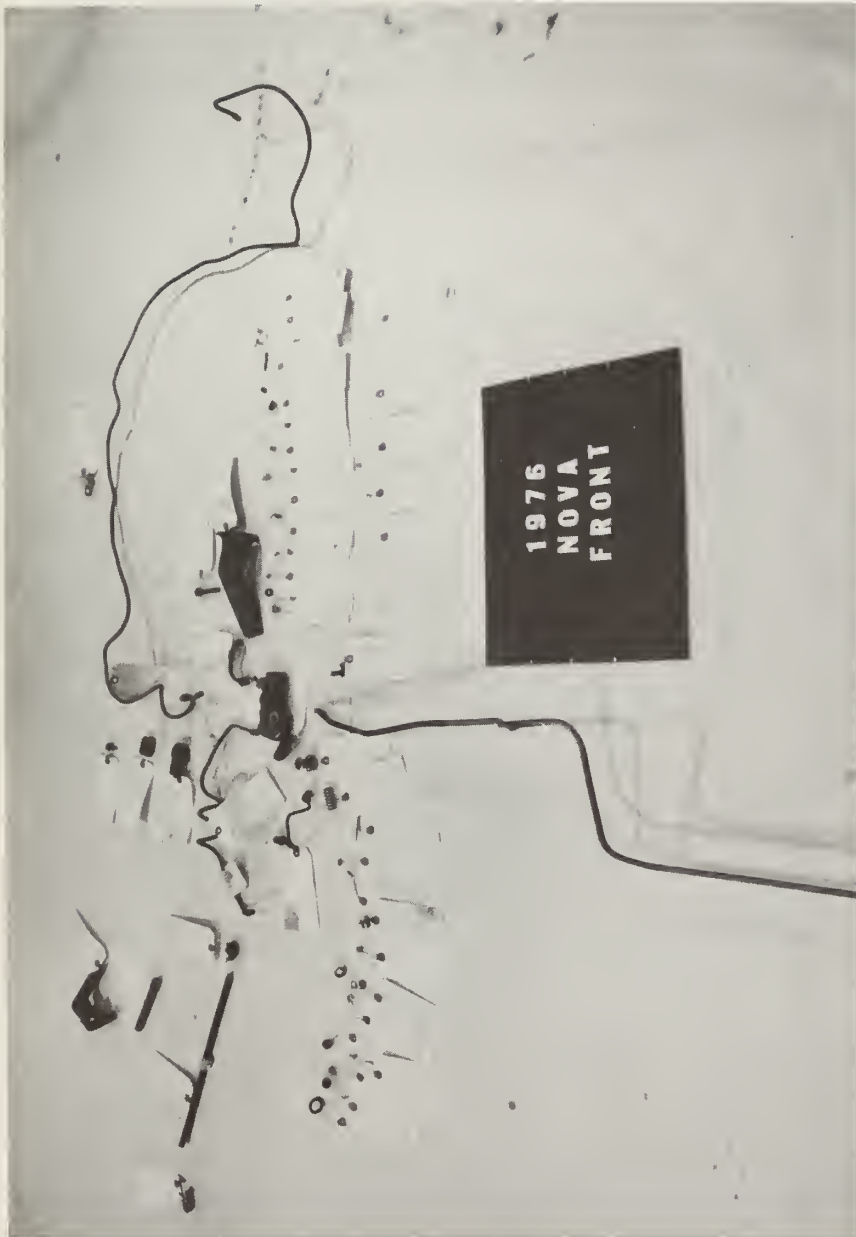
1976 GM CHEVROLET NOVA
FRONT DISC BRAKE ASSY



1976 GM CHEVROLET NOVA
REAR BRAKE ASSY



1976 GM CHEVROLET NOVA
MASTER CYLINDER ASSY
BRAKE PEDAL ASSY
POWER BOOSTER ASSY



1976 GM CHEVROLET NOVA
FRONT BRAKE HYD. LINES &
HOSES & PRESSURE VALVE



1976 GM CHEVROLET NOVA
REAR BRAKE LINES & HOSE



1976 GM CHEVROLET NOVA
PARK BRAKE ASSY & CABLES



1966
CHEVELLE
FRONT

1966 GM CHEVROLET CHEVELLE
FRONT DRUM BRAKE ASSY



1966 GM CHEVROLET CHEVELLE
REAR DRUM BRAKE ASSY



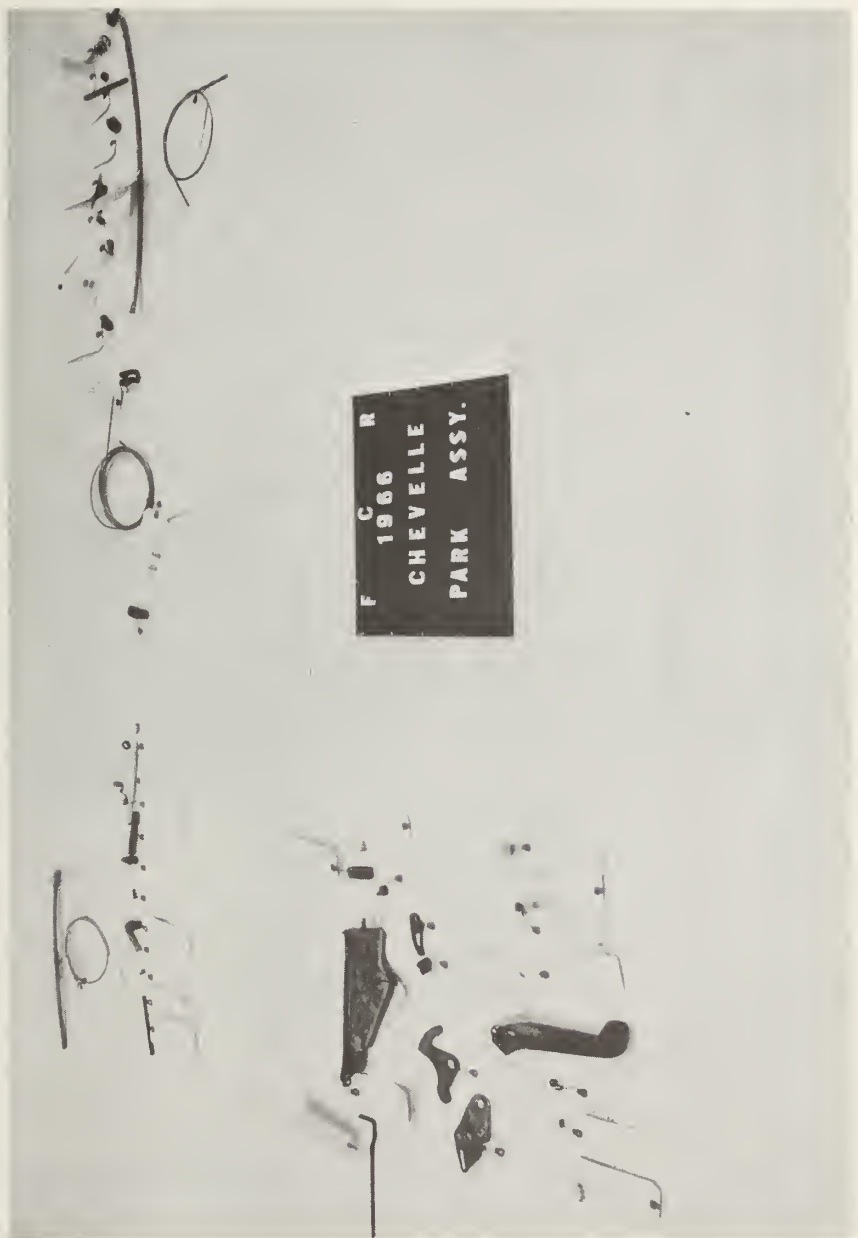
1966 GM CHEVROLET CHEVELLE
MASTER CYLINDER ASSY
BRAKE PEDAL ASSY
POWER BOOSTER ASSY



1966 GM CHEVROLET CHEVELLE
FRONT BRAKE HYD. LINES & HOSES



1966 GM CHEVROLET CHEVELLE
REAR BRAKE HYD. LINES & HOSE



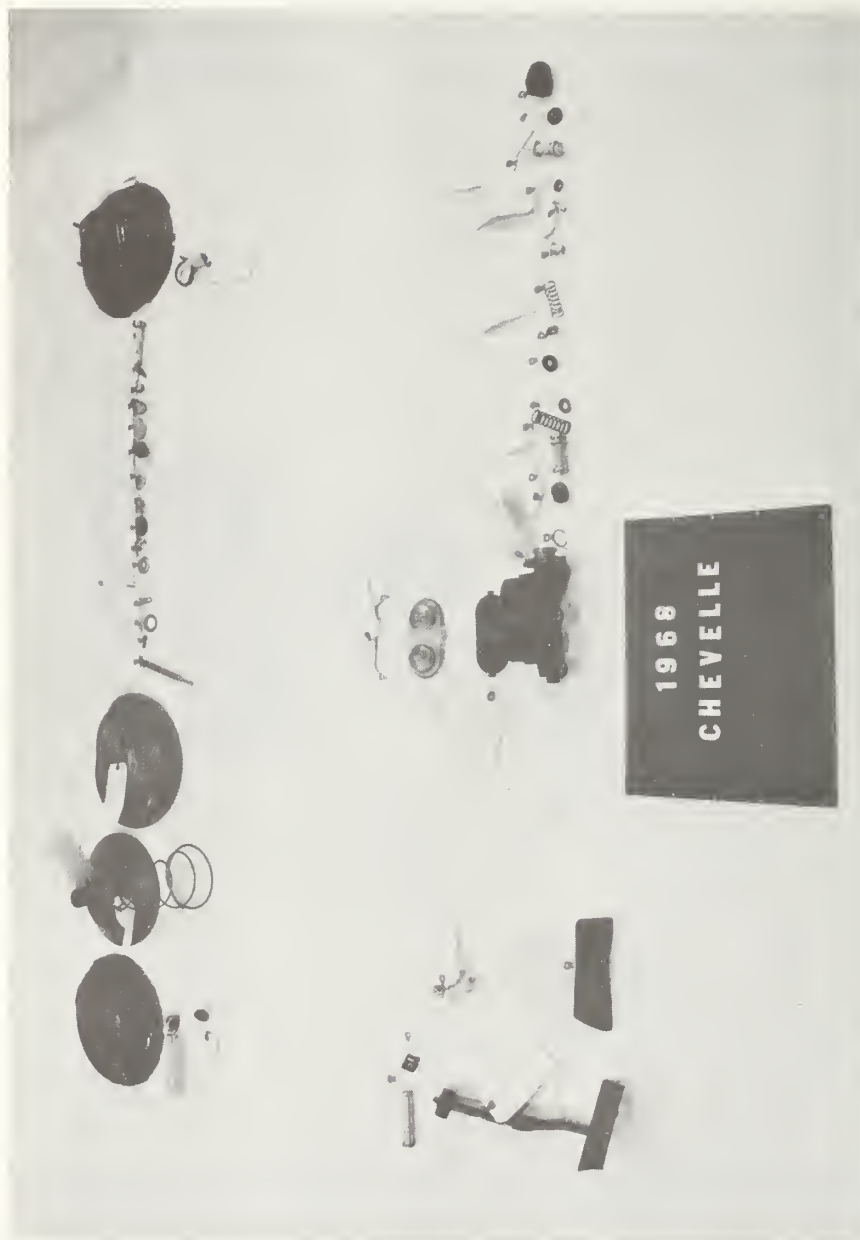
1966 GM CHEVROLET CHEVELLE
PARK BRAKE ASSY & CABLES



1968 GM CHEVROLET CHEVELLE
FRONT DISC BRAKE ASSY



1968 GM CHEVROLET CHEVELLE
REAR DRUM BRAKE ASSY



1968 GM CHEVROLET CHEVELLE
MASTER CYLINDER ASSY
BRAKE PEDAL ASSY
POWER BOOSTER ASSY



1968 GM CHEVROLET CHEVELLE
FRONT BRAKE HYD. LINES &
HOSES & PRESSURE VALVE



1968 GM CHEVROLET CHEVELLE
REAR BRAKE HYD. LINES & HOSE



1968 GM CHEVROLET CHEVELLE
PARK BRAKE ASSY & CABLES



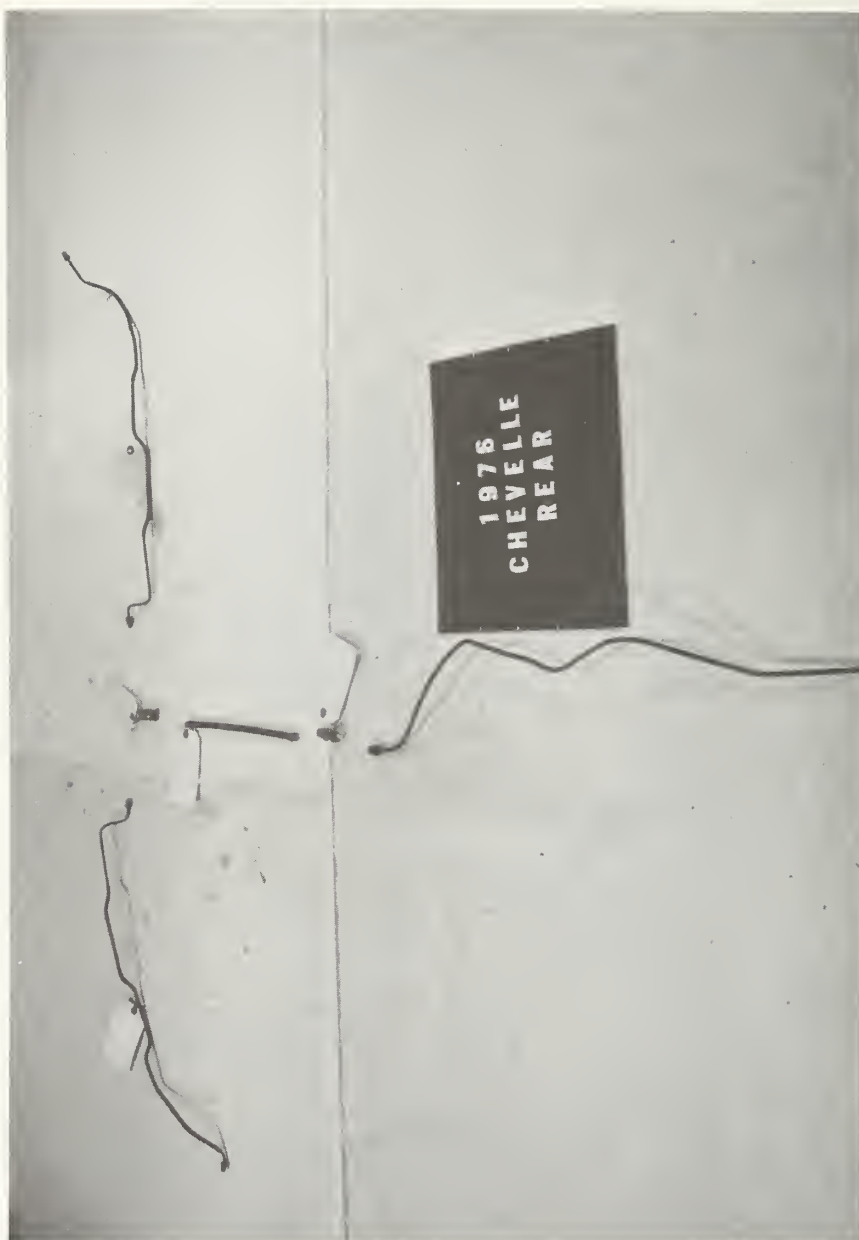
1976 GM CHEVROLET CHEVELLE
FRONT DISC BRAKE ASSY



1976 GM CHEVROLET CHEVELLE
 MASTER CYLINDER ASSY
 BRAKE PEDAL ASSY
 POWER BOOSTER ASSY



1976 GM CHEVROLET CHEVELLE
FRONT BRAKE HYD. LINES &
HOSES & PRESSURE VALVE



1976 GM CHEVROLET CHEVELLE
REAR BRAKE HYD. LINES & HOSE



1976 GM CHEVROLET CHEVELLE
PARK BRAKE ASSY & CABLES



1966 GM CHEVROLET CAPRICE
FRONT DRUM BRAKE ASSY



1966 GM CHEVROLET CAPRICE
REAR DRUM BRAKE ASSY



1966 GM CHEVROLET CAPRICE
MASTER CYLINDER ASSY
BRAKE PEDAL ASSY
POWER BOOSTER ASSY



1966 GM CHEVROLET CAPRICE
FRONT BRAKE HYD. LINES & HOSES



1966 GM CHEVROLET CAPRICE
REAR BRAKE HYD. LINES & HOSE



1966 GM CHEVROLET CAPRICE
PARK BRAKE ASSY & CABLES



1968 GM CHEVROLET CAPRICE
FRONT DISC BRAKE ASSY



1968 GM CHEVROLET CAPRICE
REAR DRUM BRAKE ASSY



1968 GM CHEVROLET CAPRICE
MASTER CYLINDER ASSY
BRAKE PEDAL ASSY
POWER BOOSTER ASSY



1968 GM CHEVROLET CAPRICE
FRONT BRAKE HYD. LINES &
HOSES & PRESSURE VALVE



1968 GM CHEVROLET CAPRICE
REAR BRAKE HYD. LINES & HOSE



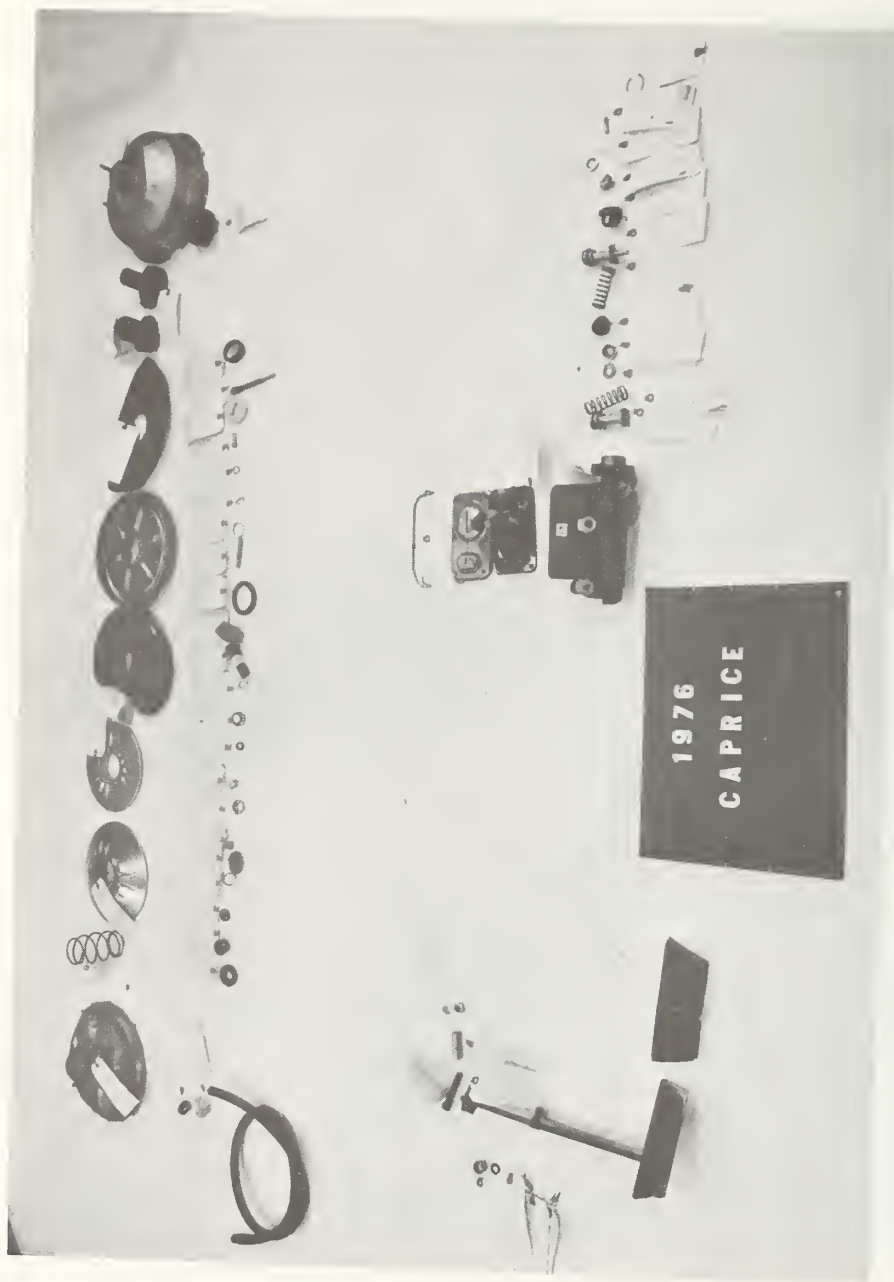
1968 GM CHEVROLET CAPRICE
PARK BRAKE ASSY & CABLES



1976 GM CHEVROLET CAPRICE
FRONT DISC BRAKE ASSY



1976 GM CHEVROLET CAPRICE
REAR DRUM BRAKE ASSY



1976 GM CHEVROLET CAPRICE
 MASTER CYLINDER ASSY
 BRAKE PEDAL ASSY
 POWER BOOSTER ASSY



1976 GM CHEVROLET CAPRICE
FRONT BRAKE HYD. LINES &
HOSES & PRESSURE VALVE



1976 GM CHEVROLET CAPRICE
REAR BRAKE LINES & HOSE



1976 GM CHEVROLET CAPRICE
PARK BRAKE ASSY & CABLES



1966 GM PONTIAC BONNEVILLE
FRONT DRUM BRAKE ASSY



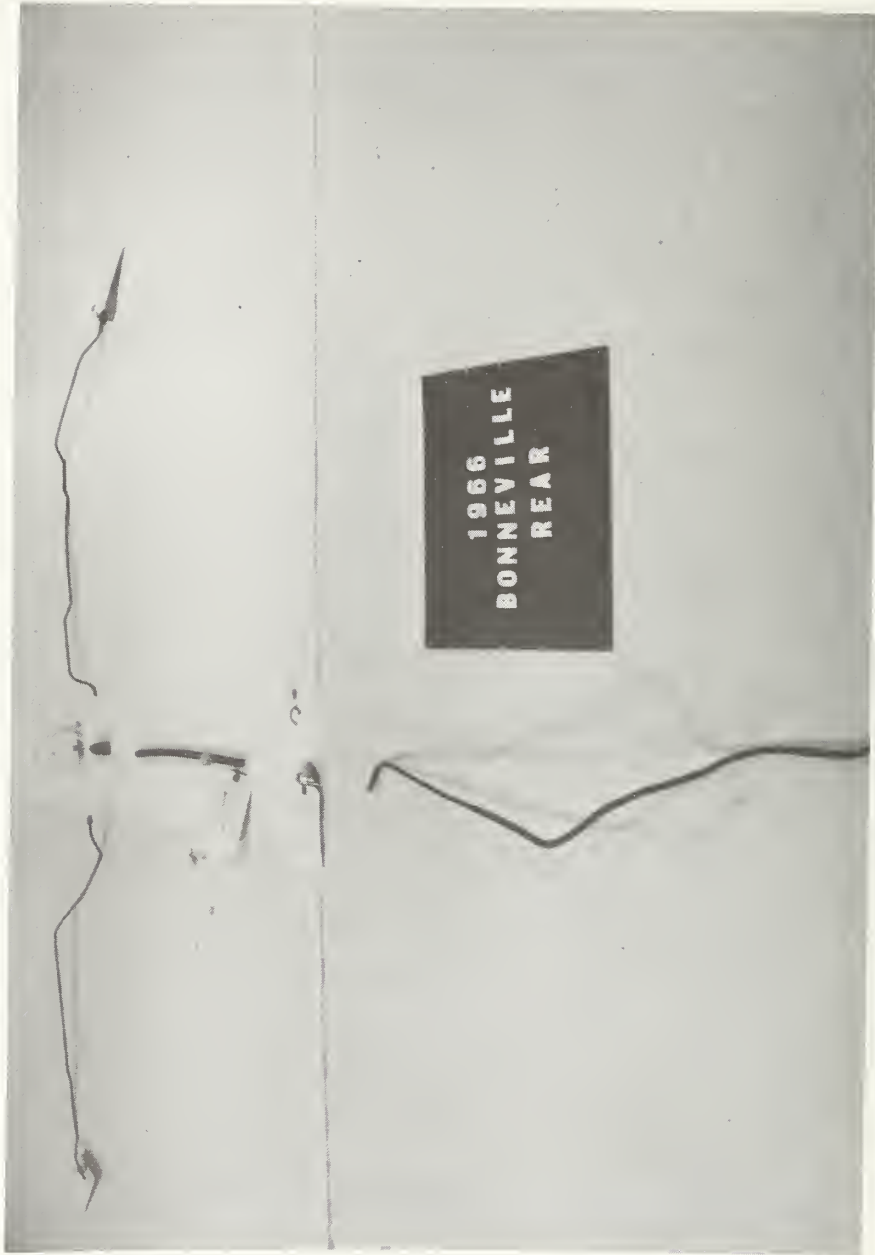
1966 GM PONTIAC BONNEVILLE
REAR DRUM BRAKE ASSY



1966 GM PONTIAC BONNEVILLE
 MASTER CYLINDER ASSY
 BRAKE PEDAL ASSY
 POWER BOOSTER ASSY



1966 GM PONTIAC BONNEVILLE
FRONT BRAKE HYD. LINES & HOSES



1966 GM PONTIAC BONNEVILLE
REAR BRAKE HYD. LINES & HOSES



1966 GM PONTIAC BONNEVILLE
PARK BRAKE ASSY & CABLES



1968 GM PONTIAC BONNEVILLE
FRONT DISC BRAKE ASSY



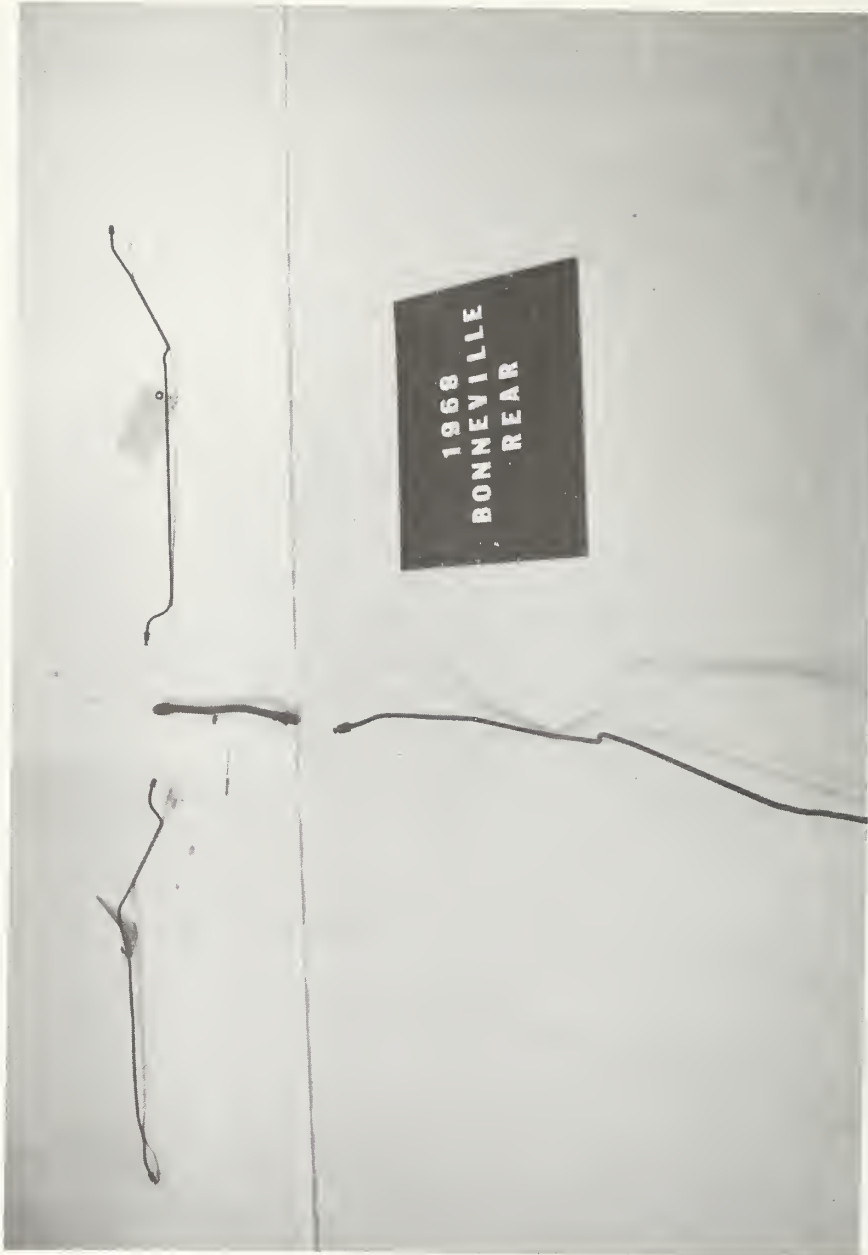
1968 GM PONTIAC BONNEVILLE
REAR DRUM BRAKE ASSY



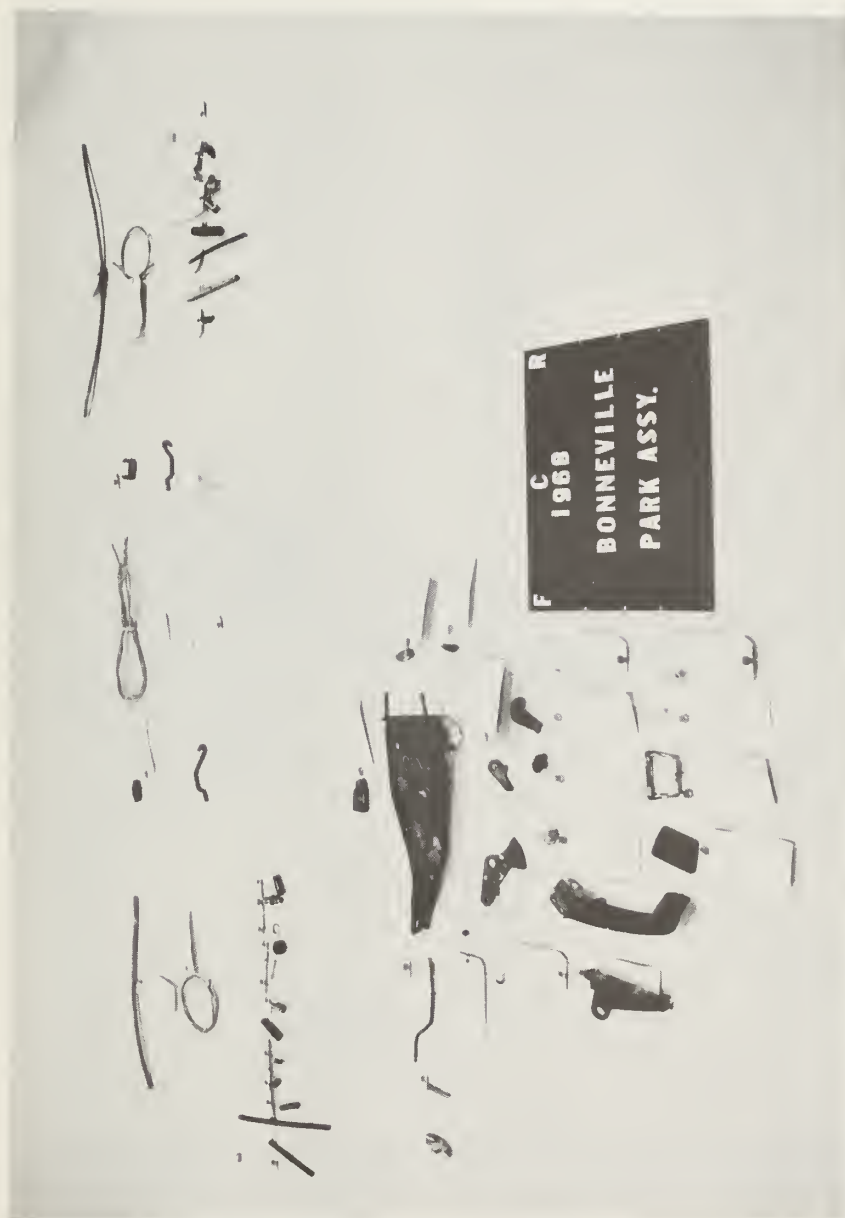
1968 GM PONTIAC BONNEVILLE
MASTER CYLINDER ASSY
BRAKE PEDAL ASSY
POWER BOOSTER ASSY



1968 GM PONTIAC BONNEVILLE
FRONT BRAKE HYD. LINES & HOSES
& PRESSURE VALVE



1968 GM PONTIAC BONNEVILLE
REAR BRAKE HYD. LINES & HOSE



1968 GM PONTIAC BONNEVILLE
PARK BRAKE ASSY & CABLES



1976 GM PONTIAC BONNEVILLE
FRONT DISC BRAKE ASSY



1976 GM PONTIAC BONNEVILLE
REAR DRUM BRAKE ASSY



1976 GM PONTIAC BONNEVILLE
 MASTER CYLINDER ASSY
 BRAKE PEDAL ASSY
 POWER BOOSTER ASSY



1976 GM PONTIAC BONNEVILLE
FRONT BRAKE HYD. LINES &
HOSES & PRESSURE VALVE



1976 GM PONTIAC BONNEVILLE
REAR BRAKE HYD. LINES & HOSE



1976 GM PONTIAC BONNEVILLE
PARK BRAKE ASSY & CABLES



1966 GM BUICK ELECTRA
FRONT DRUM BRAKE ASSY

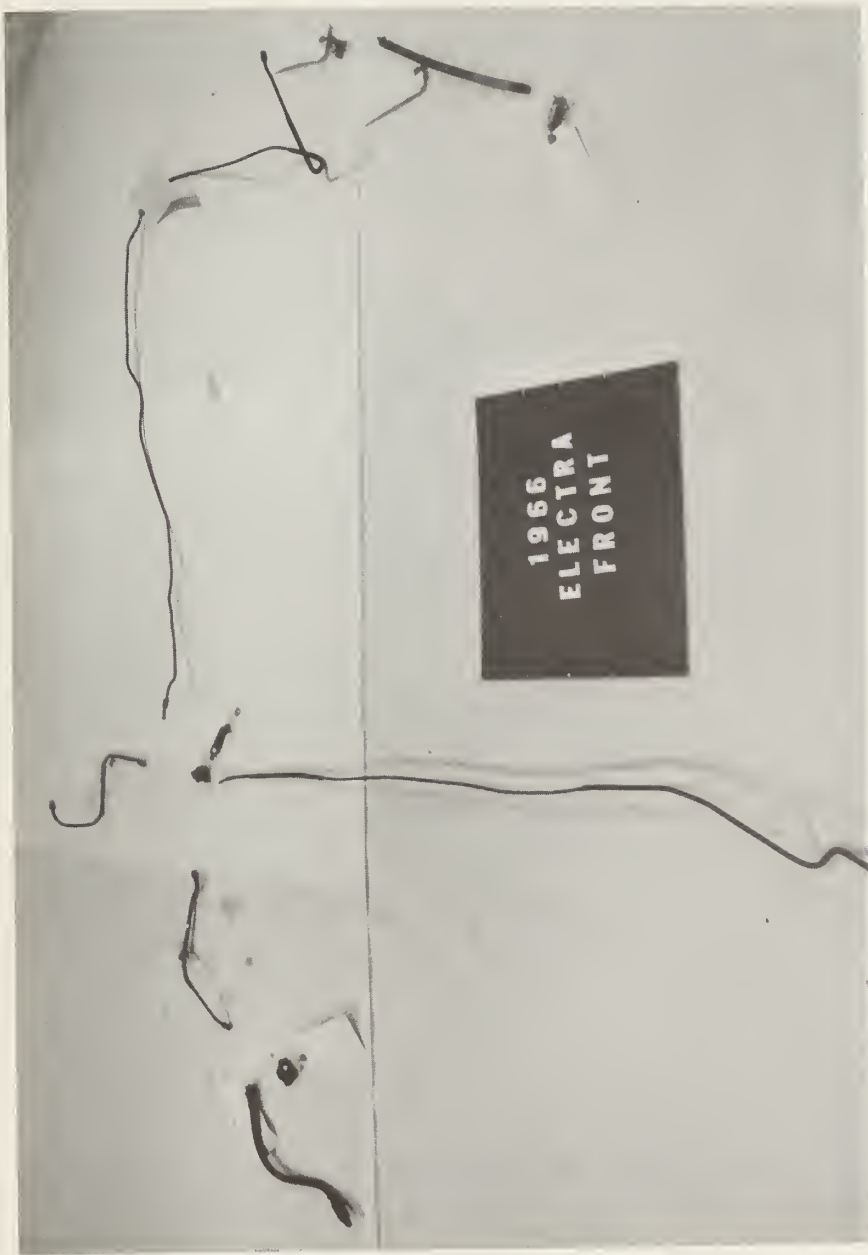


1966
ELECTRA
REAR

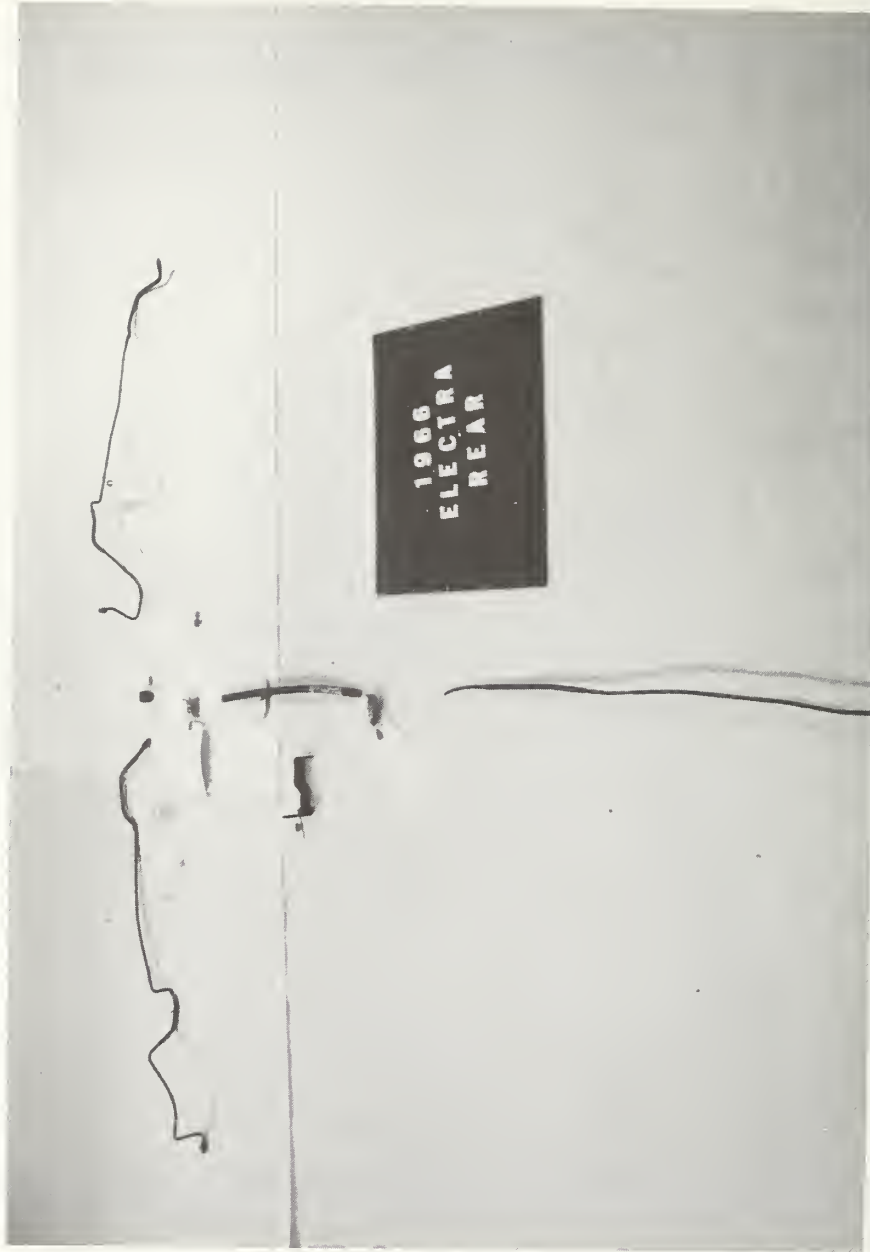
1966 GM BUICK ELECTRA
REAR DRUM BRAKE ASSY



1966 GM BUICK ELECTRA
MASTER CYLINDER ASSY
BRAKE PEDAL ASSY
POWER BOOSTER ASSY



1966 GM BUICK ELECTRA
FRONT BRAKE HYD. LINES &
HOSES



1966 GM BUICK ELECTRA
REAR BRAKE HYD. LINES &
HOSE



1966 GM BUICK ELECTRA
PARK BRAKE ASSY & CABLES



1968 GM BUICK ELECTRA
FRONT DISC BRAKE ASSY



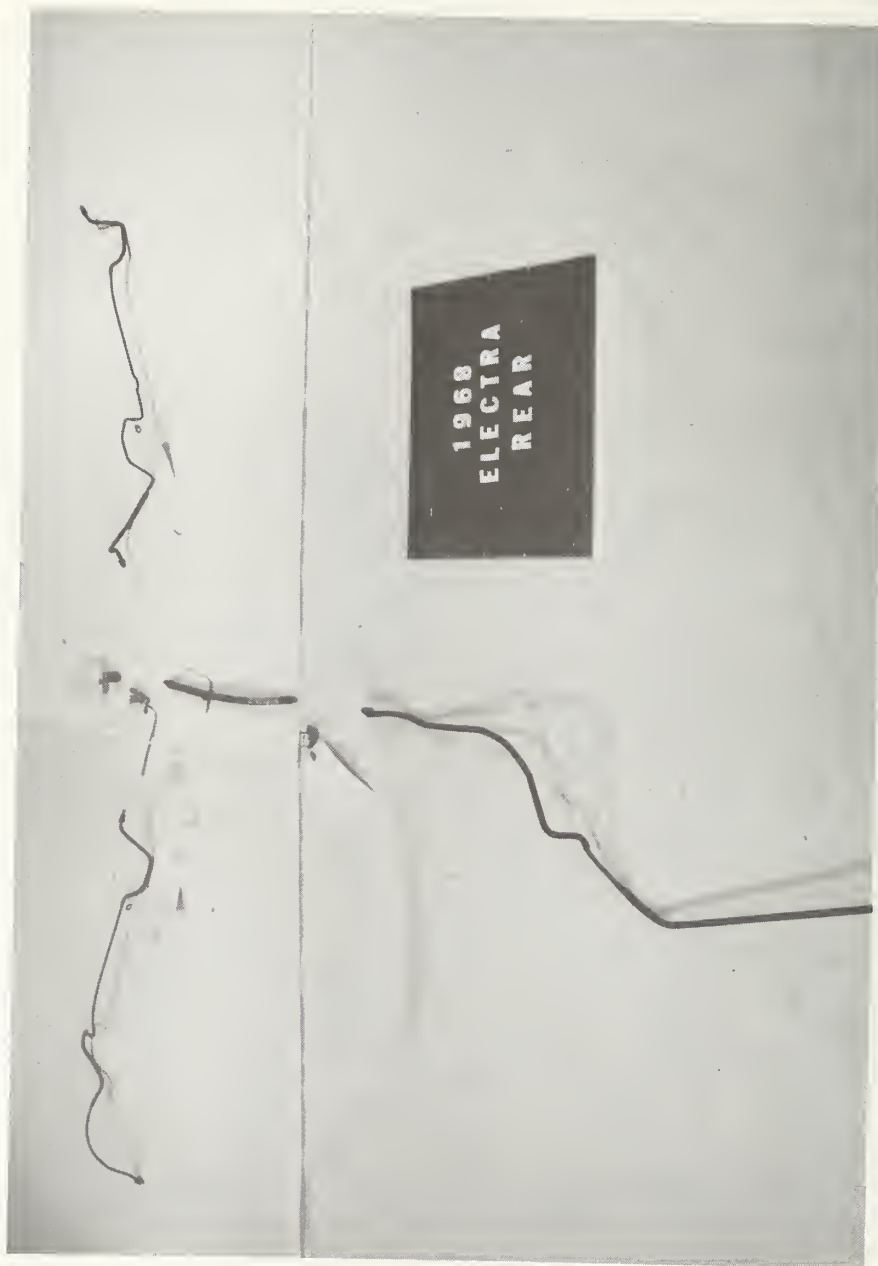
1968 GM BUICK ELECTRA
REAR DRUM BRAKE ASSY



1968 GM BUICK ELECTRA
MASTER CYLINDER ASSY
BRAKE PEDAL ASSY
POWER BOOSTER ASSY



1968 GM BUICK ELECTRA
FRONT BRAKE HYD. LINES &
HOSES & PRESSURE VALVE



1968 GM BUICK ELECTRA
REAR BRAKE HYD. LINES &
HOSE



1968 GM BUICK ELECTRA
PARK BRAKE ASSY & CABLES



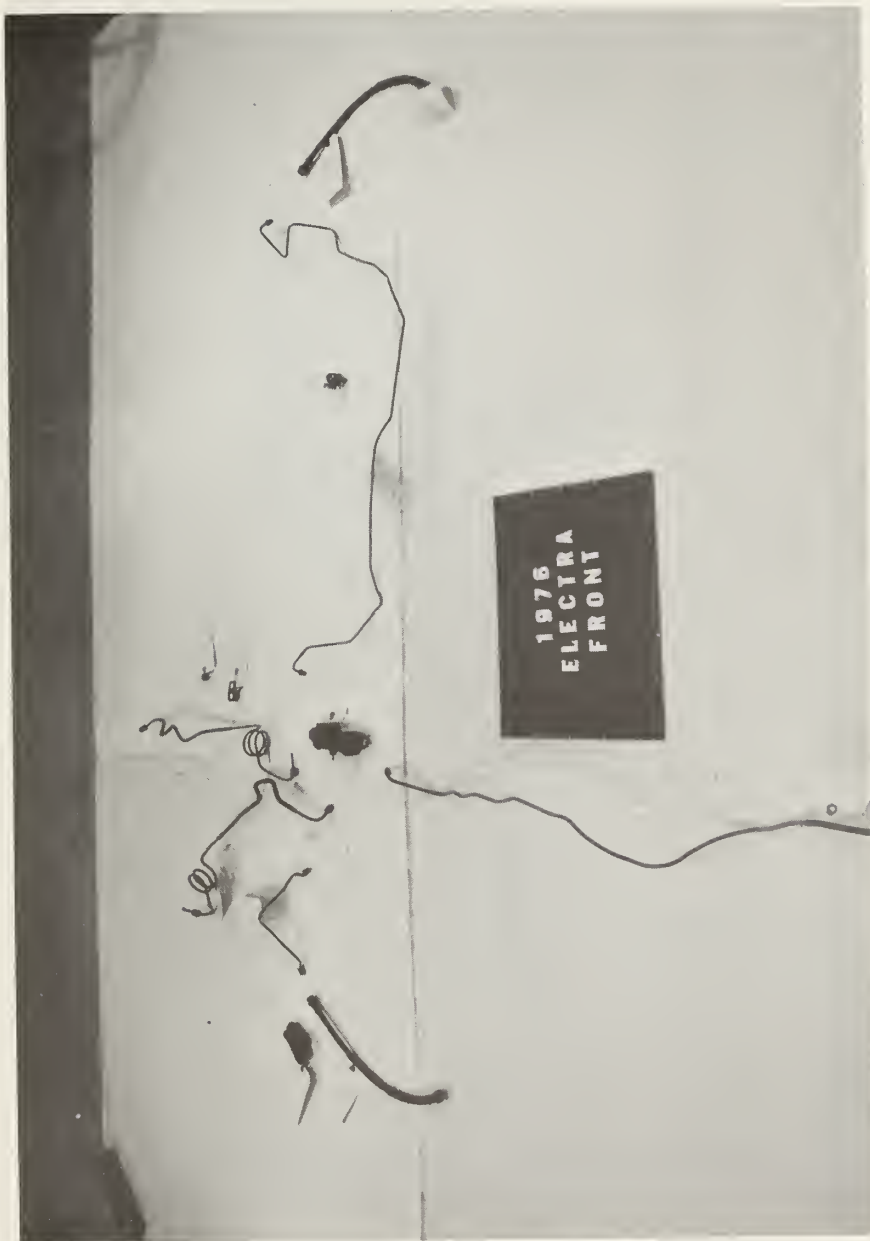
1976 GM BUICK ELECTRA
FRONT DISC BRAKE ASSY



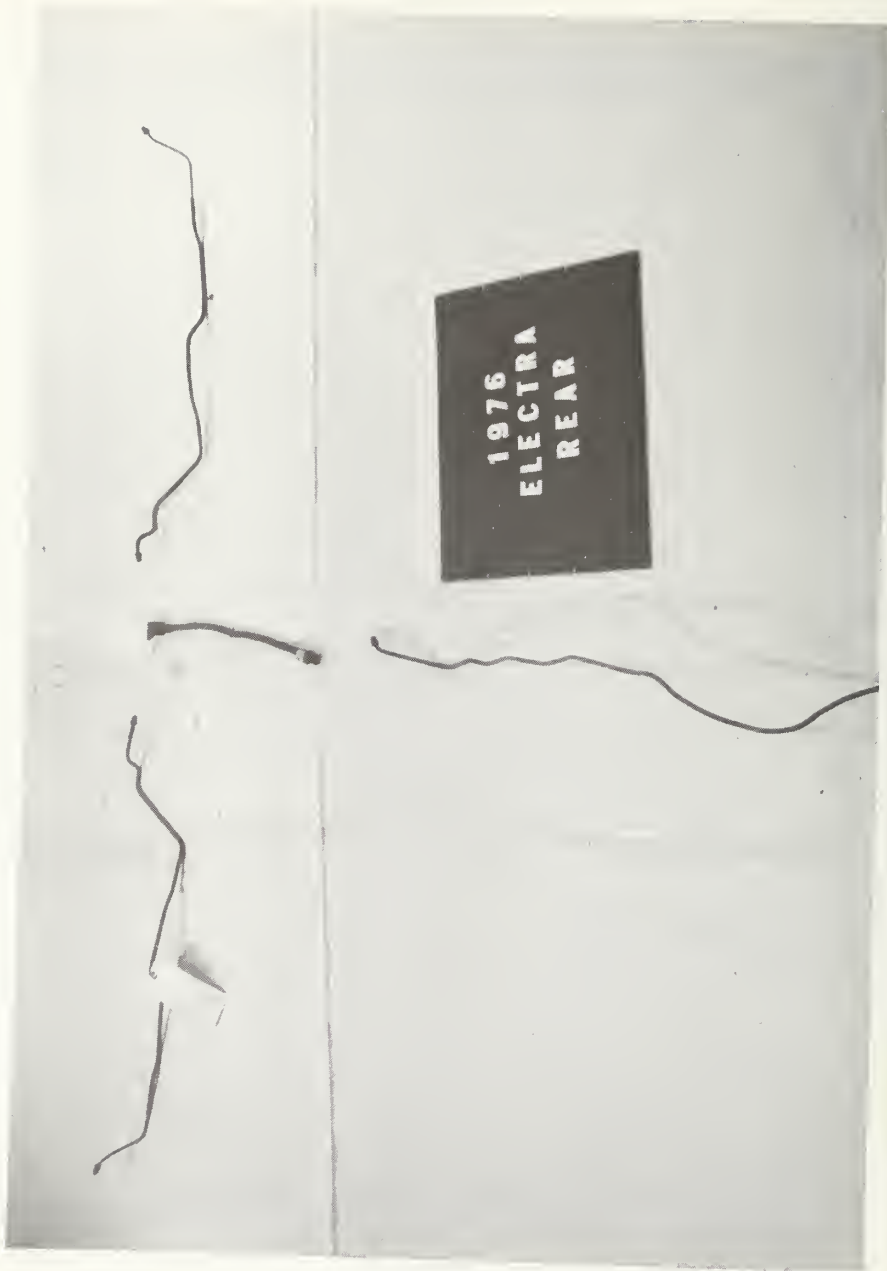
1976 GM BUICK ELECTRA
REAR DRUM BRAKE ASSY



1976 GM BUICK ELECTRA
 MASTER CYLINDER ASSY
 BRAKE PEDAL ASSY
 POWER BOOSTER ASSY



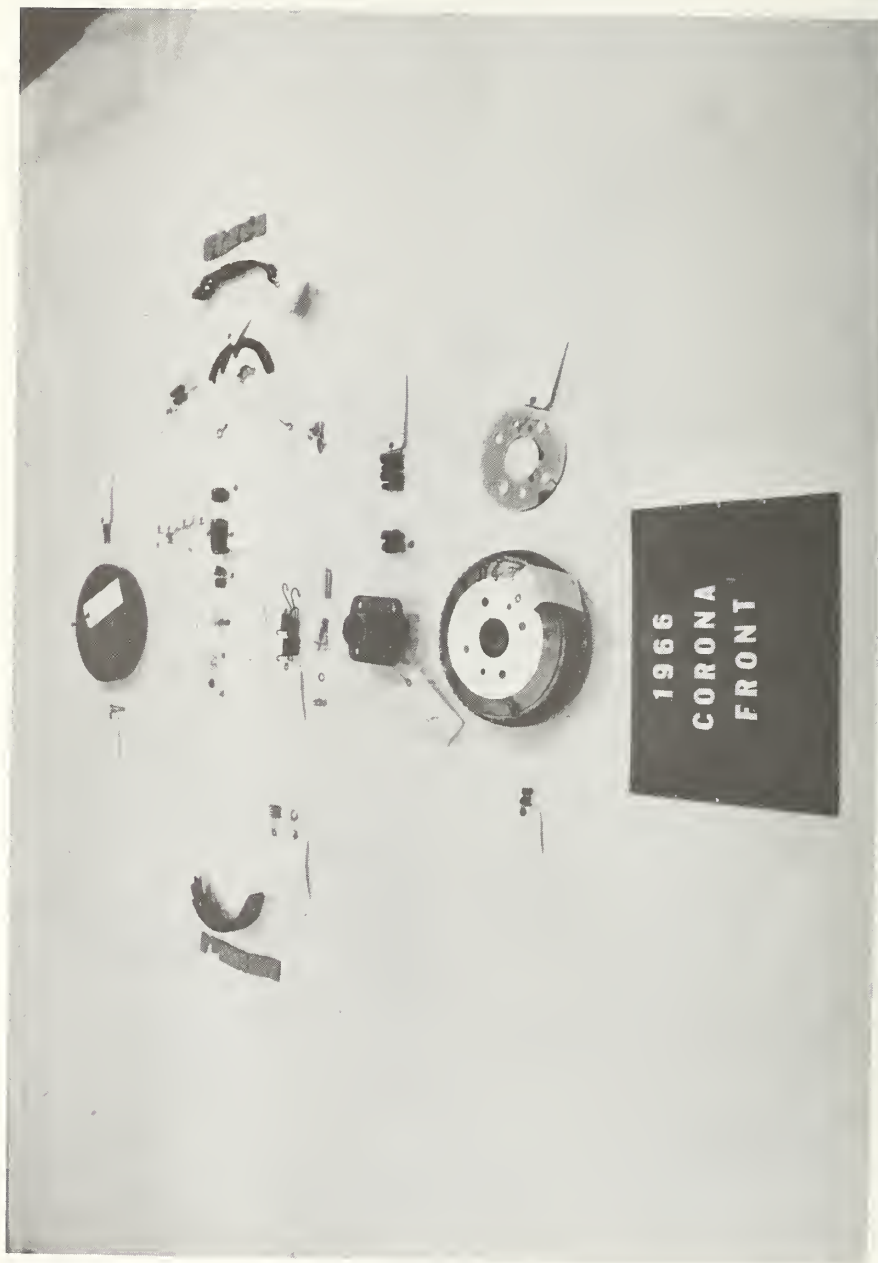
1976 GM BUICK ELECTRA
FRONT BRAKE HYD. LINES &
HOSES & PRESSURE VALVE



1976 GM BUICK ELECTRA
REAR BRAKE HYD. LINES &
HOSES



1976 GM BUICK ELECTRA
PARK BRAKE ASSY & CABLES



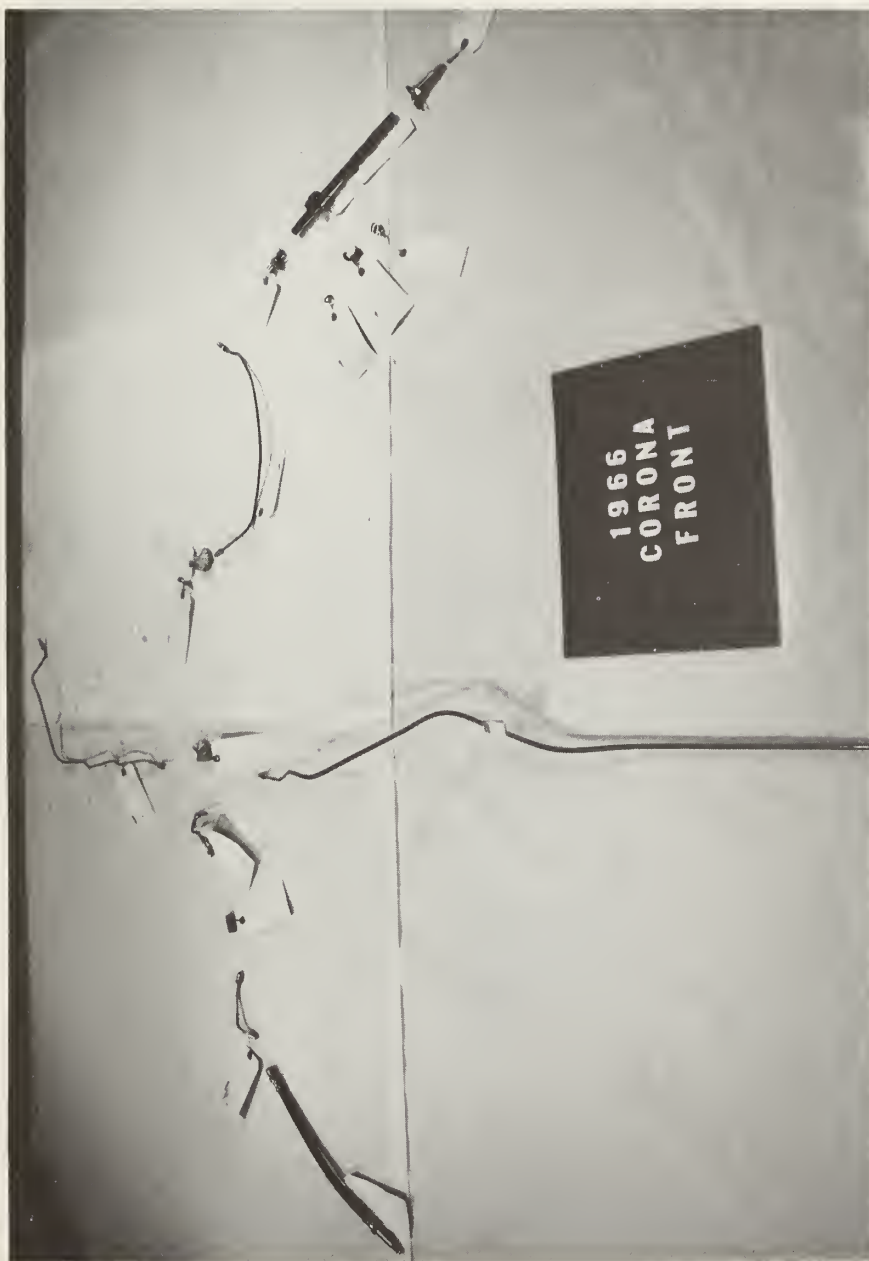
1966 TOYOTA CORONA
FRONT DRUM BRAKE ASSY



1966 TOYOTA CORONA
REAR DRUM BRAKE ASSY



1966 TOYOTA CORONA
BRAKE PEDAL PARTS



1966 TOYOTA CORONA
FRONT BRAKE HYD. LINES & HOSES



1966 TOYOTA CORONA
REAR BRAKE HYD. LINES & HOSE



1966 TOYOTA CORONA
PARK BRAKE ASSY



1968 TOYOTA CORONA
FRONT DRUM BRAKE ASSY



1968 TOYOTA CORONA
REAR DRUM BRAKE ASSY



1968 TOYOTA CORONA
MASTER CYLINDER ASSY
BRAKE PEDAL ASSY



1968 TOYOTA CORONA
FRONT BRAKE HYD. LINES &
HOSES & PRESSURE VALVE



1968 TOYOTA CORONA
REAR BRAKE HYD. LINES & HOSES



1968 TOYOTA CORONA
PARK BRAKE ASSY & CABLES



1976 TOYOTA CORONA
FRONT DISC BRAKE ASSY



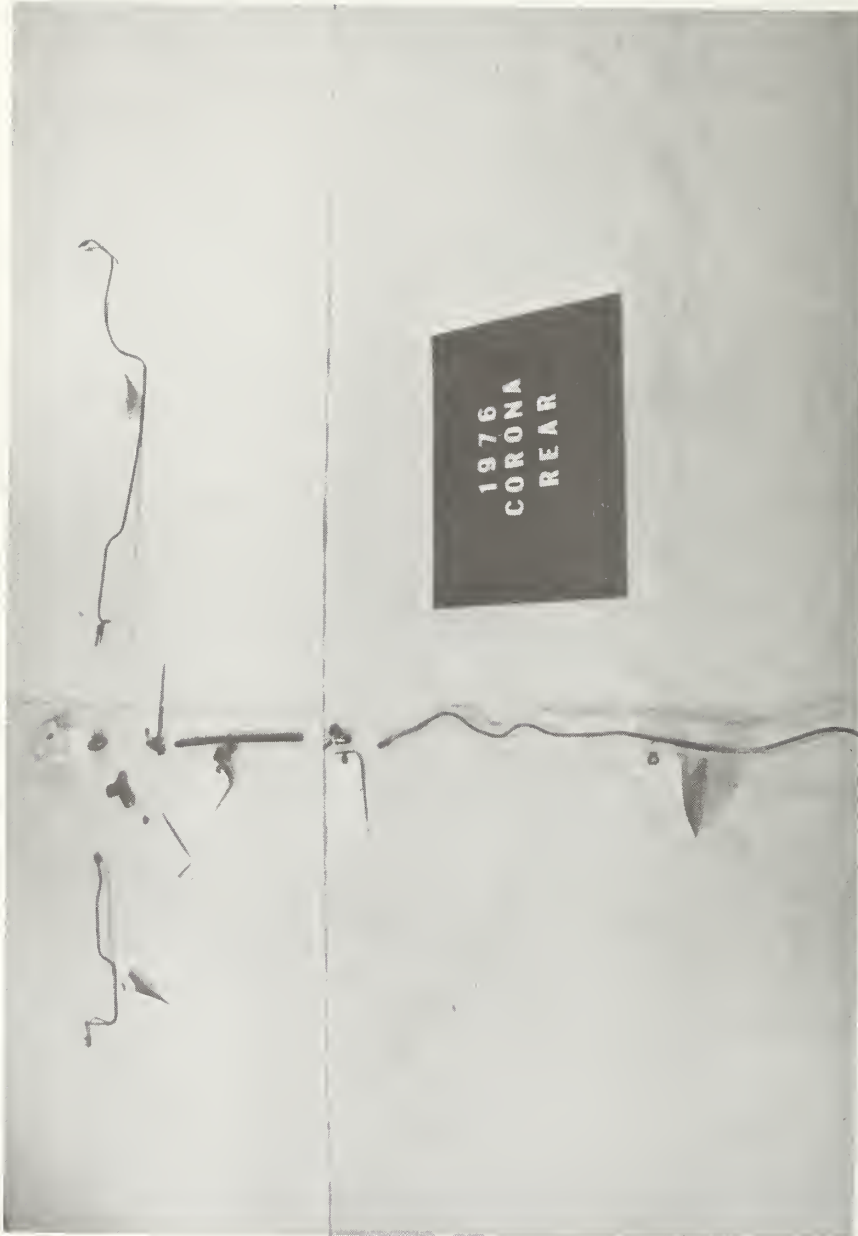
1976 TOYOTA CORONA
REAR DRUM BRAKE ASSY



1976 TOYOTA CORONA
MASTER CYLINDER ASSY
BRAKE PEDAL ASSY
POWER BOOSTER ASSY



1976 TOYOTA CORONA
FRONT BRAKE HYD. LINES &
HOSES & PRESSURE VALVE



1976 TOYOTA CORONA
REAR BRAKE HYD. LINES & HOSE



1976 TOYOTA CORONA
PARK BRAKE ASSY & CABLES



1968 TOYOTA COROLLA
FRONT DRUM BRAKE ASSY



1968 TOYOTA COROLLA
REAR DRUM BRAKE ASSY



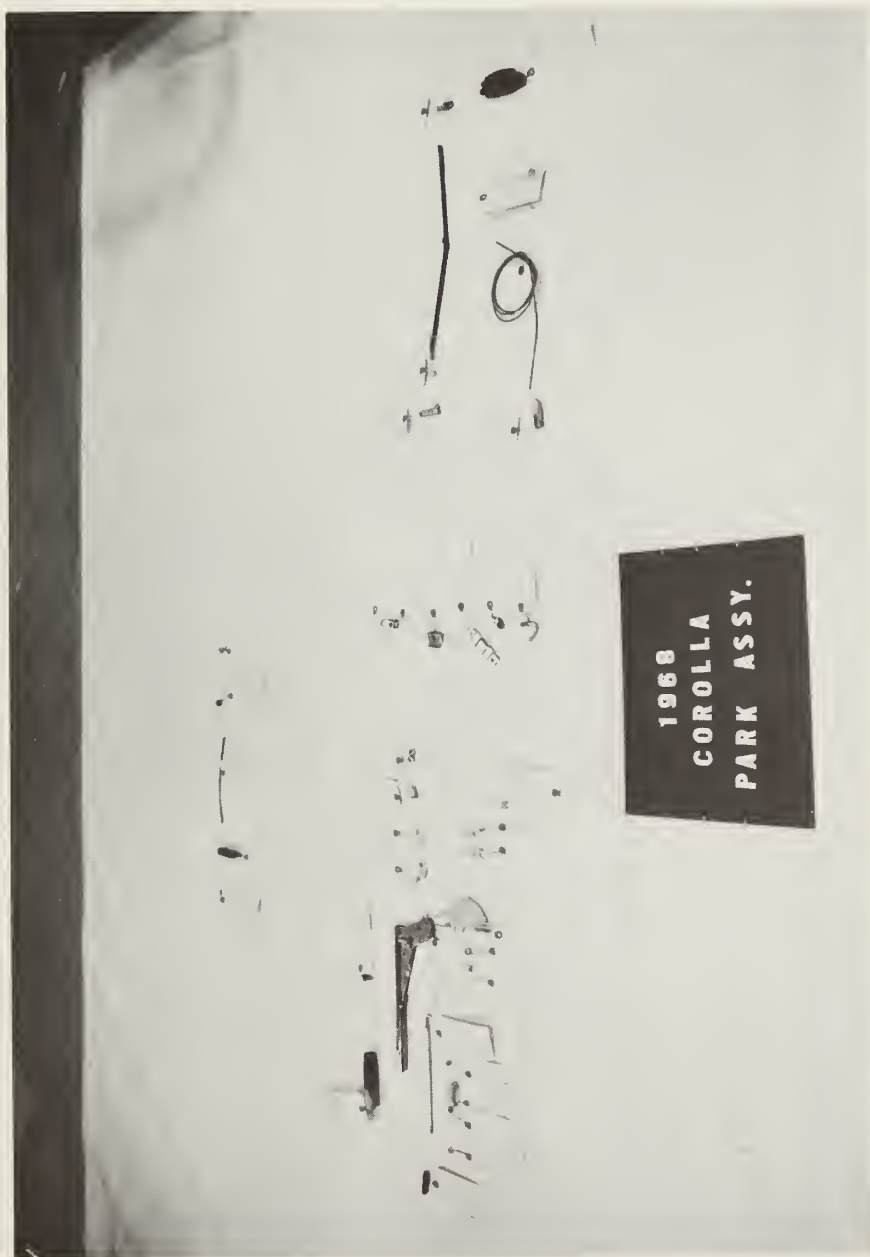
1968 TOYOTA COROLLA
MASTER CYLINDER ASSY
BRAKE PEDAL ASSY
POWER BOOSTER ASSY



1968 TOYOTA COROLLA
FRONT BRAKE HYD. LINES & HOSES



1968 TOYOTA COROLLA
REAR BRAKE HYD. LINES & HOSE



1968 TOYOTA COROLLA
PARK BRAKE ASSY & CABLES



1976 TOYOTA COROLLA
FRONT DISC BRAKE ASSY



1976 TOYOTA COROLLA
REAR DRUM BRAKE ASSY



1976 TOYOTA COROLLA
MASTER CYLINDER ASSY
BRAKE PEDAL ASSY
POWER BOOSTER ASSY



1976 TOYOTA COROLLA
FRONT BRAKE HYD. LINES &
HOSES & PRESSURE VALVE



1976 TOYOTA COROLLA
BRAKE LINES & HOSES



1976 TOYOTA COROLLA
PARK BRAKE ASSY & CABLES



1966 VOLKSWAGEN BEETLE
FRONT DRUM BRAKE ASSY



1966 VOLKSWAGEN BEETLE
REAR DRUM BRAKE ASSY



1966 VOLKSWAGEN BEETLE
MASTER CYLINDER ASSY
BRAKE PEDAL ASSY



1966 VOLKSWAGEN BEETLE
FRONT BRAKE LINES & HOSES



1966 VOLKSWAGEN BEETLE
REAR BRAKE LINES AND HOSES



1966 VOLKSWAGEN BEETLE
PARK BRAKE ASSY & CABLES



1968 VOLKSWAGEN BEETLE
FRONT DRUM BRAKE ASSY



1968 VOLKSWAGEN BEETLE
REAR DRUM BRAKE ASSY



1968 VOLKSWAGEN BEETLE
MASTER CYLINDER ASSY
BRAKE PEDAL ASSY



1968 VOLKSWAGEN BEETLE
FRONT BRAKE LINES & HOSES



1969 VOLKSWAGEN BEETLE
REAR BRAKE LINES & HOSES



1968 VOLKSWAGEN BEETLE
PARK BRAKE ASSY & CABLES



1976 VOLKSWAGEN BEETLE
FRONT DRUM BRAKE ASSY



1976 VOLKSWAGEN BEETLE
REAR DRUM BRAKE ASSY



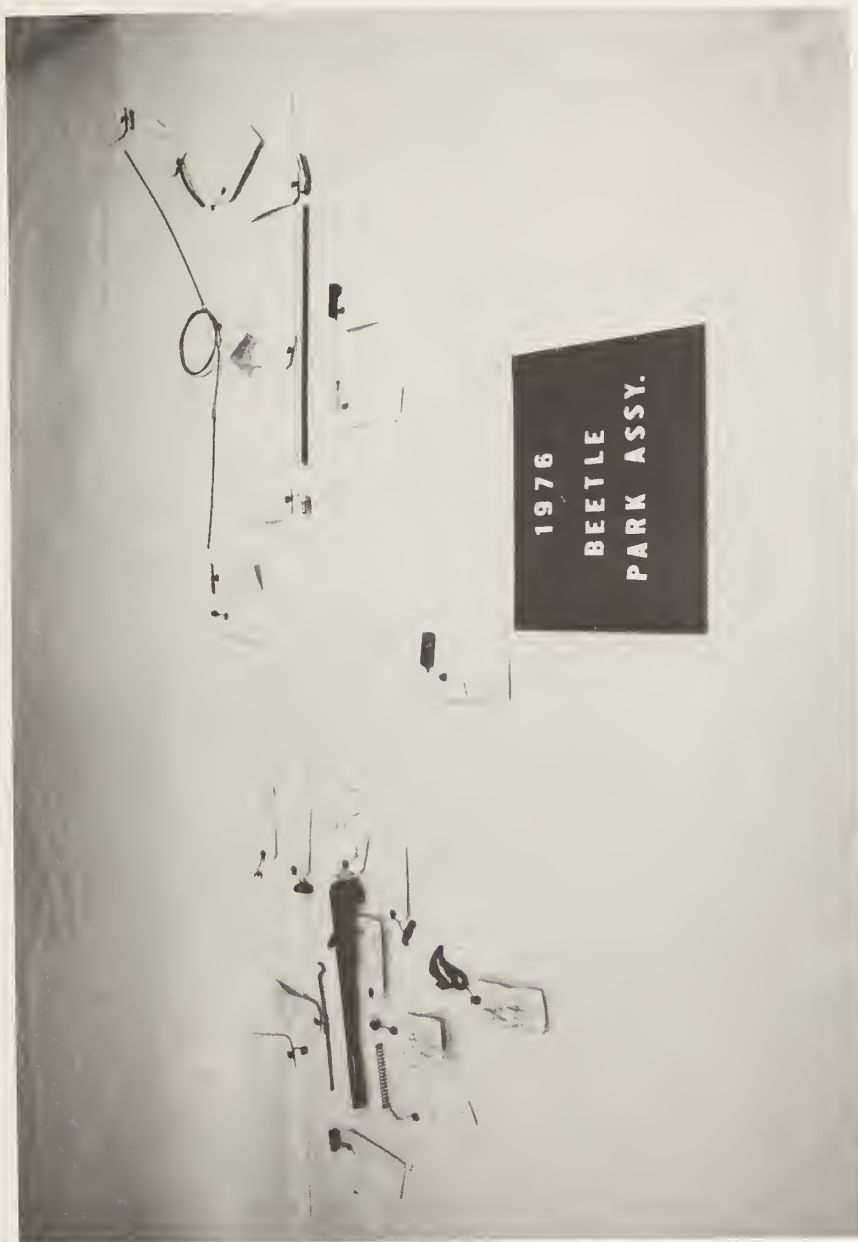
1976 VOLKSWAGEN BEETLE
MASTER CYLINDER ASSY
BRAKE PEDAL ASSY



1976 VOLKSWAGEN BEETLE
FRONT BRAKE LINES & HOSES



1976 VOLKSWAGEN BEETLE
REAR BRAKE LINES & HOSES



1976 VOLKSWAGEN BEETLE
PARK BRAKE ASSY & CABLES

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Harvey, M.

Cost evaluation
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